
PROJECT COORDINATOR'S REPORT

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 8.5-9.0 million hectares. Qualitative and quantitative transformation has taken place in cotton production in India. Area wise, India ranks first in global scenario (about 20% of the world 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 (AICCIP, 2008). During current year also, 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.

In order to maintain pace with the increased demand for the commodity, both in international and national markets, it is imperative to give impetus for development of appropriate newer cotton cultivation technologies on a continuous scale so that the gains so far achieved are consolidated and newer levels of productivity are reached in all location-specific situations. The role of AICCIP personnel is of paramount importance in this respect to ensure enhanced productivity, meet required fibre quality standards and also dissemination of newer technologies besides playing a proactive role in a focused manner for concerted efforts to meet the targets. 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 900 kg / ha and under rainfed conditions from the present range of 300 – 350 kg / ha to 500 kg lint per hectare.

During the pre-independence period, India produced short and medium staple cottons. Today, India produces cotton fibres with staple lengths for 6 to 120^s counts, from non-spinnable coarse to medium, long, extra long and superfine cotton. In India, cotton is grown under diverse agro-climatic conditions. Cotton is the most important commercial crop contributing nearly 65% of total raw material needs of textile industry in our country. Cotton and Textile exports account for nearly one-third of total foreign exchange earnings of India, crossing Rs.75,000 crores. India has achieved significant breakthrough in cotton yarn exports besides increasing its global market share in cotton textiles and apparels. About 60 million people of our country are involved directly or indirectly in cotton production, processing, textiles and related activities.

In a historical perspective, it is worth mentioning that the abolition of ICCA 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 15 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. ***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 AICCIP on 16th 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.***

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. 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 proposed under AICCIP need to be continued with more fervour and vigour by all concerned in the years to come.

World and Indian Cotton Scenario

World Cotton production is projected at 23.7 million tonnes in 2008-09, 10% lower than during previous season due to decline in world area and relatively lesser yields (ICAC, 2009). However, India registered a marginal decline in area with 9.3 million hectares and production of around 4.93 million tonnes, with the decline levelling to 290 lakh bales during 2008-09 compared to previous season best of 315 lakh bales. As regards Indian situation, the average yield has been somewhat noticed to be cause of concern calling for attention towards improvement in performance of cotton genotypes in stress situations and management of crop performance in the challenged situations of deficit rainfall, mealy bug menace, other sap sucking pest incidence, leaf reddening problem and timely availability of canal irrigation water; all these problematic issues have resulted in a noticeable decline in total productivity and also production.

The Indian cotton scenario looks brighter as compared to many other countries in the world. While the year 2007-08 was a record year of sorts for Indian cotton scenario with the highest production of 315 lakh bales and exports touching a high of 85 lakh bales, the current year scenario with production estimate of 290 lakh bales and 520 kg/ha calls for integrated efforts in sustaining and consolidating all avenues for continued higher output. The Cotton Advisory Board has estimated cotton exports during 2008-09 at 50 lakh bales.



Table1. Cotton Balance Sheet (October-September)

	(in Lakh bales of 170 kg per bale)		
	2006-07	2007-08	2008-09 (estimate)
Supply			
Opening Stock	52.0	47.50	43.00
Cotton Crop Production	280	315.0	290.0
Imports	5.53	6.50	7.00
Total Supply	337.53	369.0	340.0
Demand			
Mill Consumption	194.89	203.0	195.00
Consumption by SSI units	21.26	23.0	20.00
Non-mill consumption	15.88	15.0	15.00
Exports	58.0	85.0	50.00
Total Off-take	290.03	326.0	280.00
Closing Stock	47.50	43.0	60.00

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

State-wise Cotton Scenario

The trend in area, production and productivity of cotton is presented in Tables 2, 3 and 4 and in Figure 1. Notable progress is seen in case of southern States, particularly Andhra Pradesh and marginal decline is noticed in Gujarat, Madhya Pradesh, Punjab and Haryana. 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 2. State wise cotton area (lakh ha) from 1999-00 to 2008-09

	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09
Punjab	4.75	4.74	6.00	4.49	4.52	5.09	5.57	6.07	6.41	5.37
Haryana	5.46	5.55	6.10	5.19	5.26	6.21	5.83	5.30	4.83	4.55
Rajasthan	5.83	5.10	3.47	3.86	3.44	4.38	4.54	3.50	3.68	2.23
Gujarat	15.39	16.15	16.90	16.34	16.50	19.06	20.77	23.90	25.16	24.17
Maharashtra	32.54	30.77	29.80	28.00	27.70	28.40	28.89	30.70	31.91	31.33
Madhya Pradesh	5.25	5.06	6.23	5.45	5.91	5.76	6.35	6.39	6.62	6.55
Andhra Pradesh	10.39	10.22	10.00	8.03	8.37	11.78	9.72	9.72	10.96	13.45
Karnataka	5.40	5.60	5.91	3.93	3.13	5.21	3.81	3.75	3.88	3.90
Tamil Nadu	1.85	1.93	2.00	0.85	1.03	1.29	1.52	1.22	1.30	1.20
Others	0.45	0.64	0.90	0.53	0.51	0.68	0.80	0.87	0.80	0.98
Total	87.30	85.80	87.00	76.70	76.00	87.90	88.20	91.40	95.55	93.73



Figure 1. Cotton Scenario in India (Zone-wise)

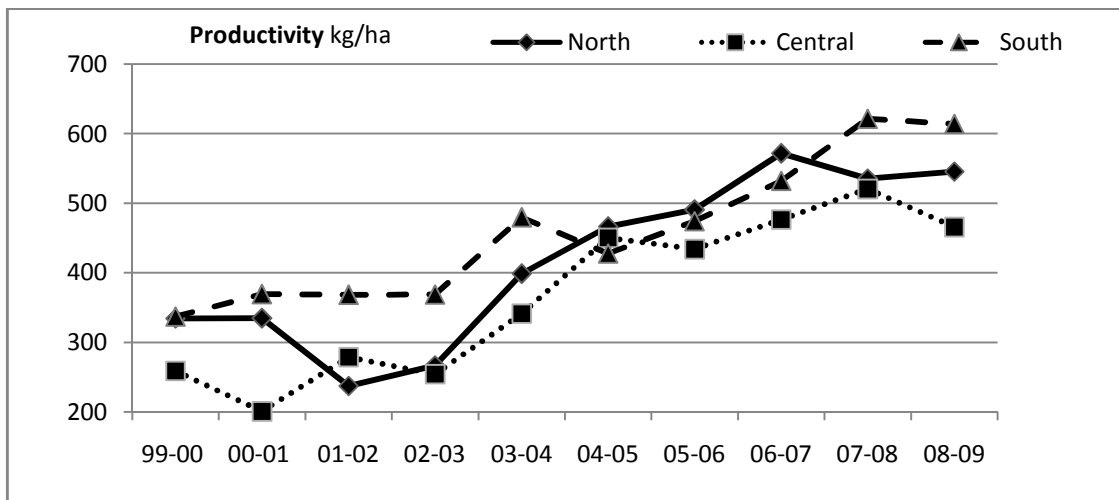
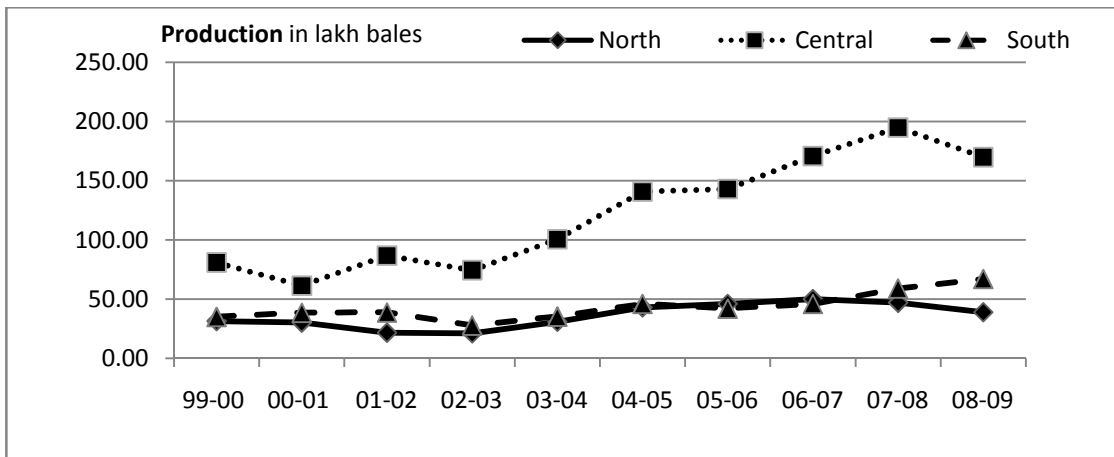
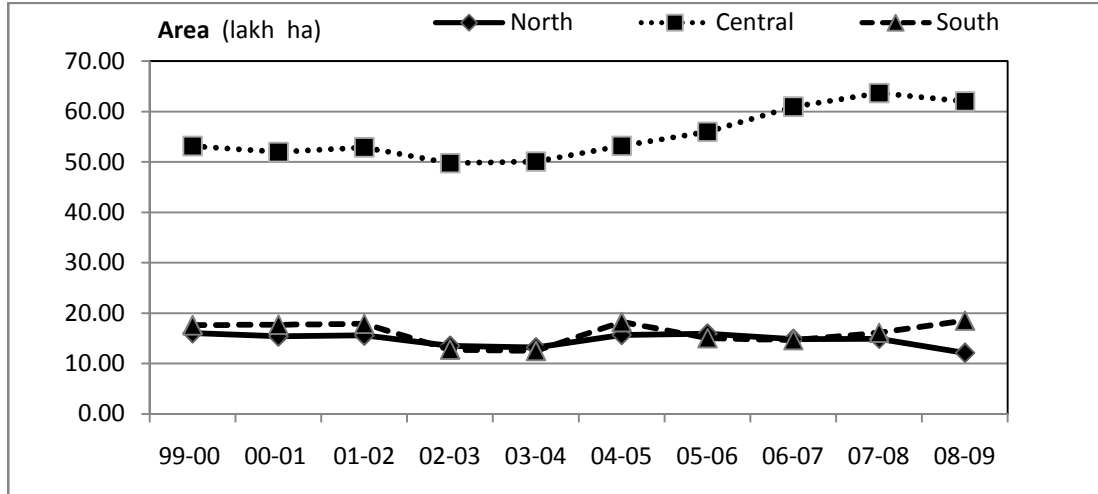


Table 3. State wise cotton production (lakh bales) from 1999-00 to 2008-09

State	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09
Punjab	7.85	9.50	9.25	7.50	10.35	16.50	21.00	26.00	22.00	17.50
Haryana	10.70	10.00	5.50	8.75	11.50	15.50	14.00	16.00	16.00	14.00
Rajasthan	13.00	10.80	7.00	5.00	9.15	11.00	11.00	8.00	9.00	7.50
Gujarat	27.50	23.80	32.50	30.50	50.00	73.00	89.00	101.00	112.00	90.00
Maharashtra	38.00	18.30	34.30	26.00	31.00	52.00	36.00	52.00	62.00	62.00
Madhya Pradesh	15.50	19.30	20.00	18.00	19.65	16.00	18.00	18.00	21.00	18.00
Andhra Pradesh	22.50	25.30	26.80	19.80	27.40	32.50	30.00	35.00	46.00	53.00
Karnataka	7.00	7.75	7.00	5.00	4.20	8.00	6.50	6.00	8.00	9.00
Tamil Nadu	5.50	5.50	5.00	3.00	3.75	5.50	5.50	5.00	5.00	5.00
Others	1.50	1.00	0.75	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Loose Supply	7.00	9.00	10.00	11.50	11.00	12.00	12.00	12.00	12.00	12.00
Total	156.00	140.00	158.00	136.00	179.00	243.00	244.00	280.00	315.00	290.00

Table 4. State wise cotton productivity (kg/ha) from 1999-00 to 2008-09

State	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09
Punjab	281	341	262	284	381	551	610	728	583	554
Haryana	332	306	153	287	356	424	373	513	563	523
Rajasthan	379	358	343	220	379	427	397	389	416	572
Gujarat	304	250	328	317	475	651	794	718	757	633
Maharashtra	199	101	195	158	191	311	213	288	330	336
Madhya Pradesh	502	647	546	561	468	472	494	479	539	467
Andhra Pradesh	368	420	454	418	565	469	527	612	714	670
Karnataka	220	235	201	216	204	261	268	272	351	392
Tamil Nadu	505	484	425	600	613	725	668	697	654	708
All India	304	278	308	302	404	470	478	521	560	526

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 22 % in the global production of cotton, more than double its share of 9.6% in 1980-81.

Table 5. Growth in Average yield (kg lint per hectare)

Year	China	USA	India	World
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
2008-09	1265	985	526	785

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. Even though it is very noteworthy to mention that Indian average lint yield has jumped from a meagre 169 kg/ha to touch 520-555 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 and in turn production, even under any eventuality.



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, with monsoon playing truant in Central India and parts of South India. Development of abiotic stress tolerant genotypes, especially moisture stress tolerant cotton varieties/hybrids needs to be given further emphasis by AICCIP breeders, physiologists and biochemists.
- ❖ 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, moderately favourable weather besides lesser insect pest load, especially bollworms, cumulatively led to notable yields.
- ❖ As seen during last year, 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, mirid 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 action plan by Central Institute for Cotton Research, Nagpur, AICCIP and various level intense discussions by National Centre for Integrated Pest Management (NCIPM), New Delhi could effectively address the menace of mealy bugs in cotton and several cultural, mechanical, biological and need-based chemical control measures have been worked out and propagated.
- ❖ The issue of use of banned chemical pesticides, untested dosages and cocktails of insecticides in the control of mealy bugs calls for concerted efforts from the plant protection group for everlasting solution. 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 again in certain areas. Practice of illegal/spurious Bt cotton hybrid seeds including F₂ seeds for planting poses serious problems in respect of yield realization, susceptibility to pests/diseases besides adverse impact on fibre qualities. The issue is being addressed effectively by Central Institute for Cotton Research, Nagpur through Bt referral laboratory.
- ❖ The year has also witnessed problem of leaf reddening calling for urgent attention of cotton production specialists to a focused approach for alleviating the stress and ensuring productivity levels at a higher plane even in adverse situations.

International Year of Natural Fibres (IYNF), 2009

The objectives of the IYNF have been proposed as:

- To raise awareness and stimulate demand for natural fibres;
- To encourage appropriate policy responses from governments to the problems faced by natural fibre industries;
- To foster an effective and enduring international partnership among the various natural fibres industries;
- To promote the efficiency and sustainability of the natural fibres industries.



In pursuing these objectives, the IYNF will contribute to the Millennium Development Goals (MDGs) number 1 (in attacking poverty and hunger), number 7 (in contributing to environmental sustainability), and number 8 (in promoting the formation of an international partnership). All players in the natural fibres industries should benefit from the International Year of Natural Fibres, including particularly the farmers and the exporting countries. Processors, manufacturers and others in the chain will also benefit. There will be environmental/health benefits in consuming as well as producing countries, from increased awareness and increased use of natural fibres. The IYNF will be subject to the general guidance of an International Steering Committee, and under the technical responsibility of an IYNF Coordination Unit in FAO. The success of the IYNF will depend on a partnership of various natural fibre groups working together. There are a number of such groups, each concerned with an individual natural fibre.

FAO is to coordinate and lead the IYNF, working in close cooperation with an International Steering Committee. FAO's role is primarily to communicate information about natural fibres and the IYNF, to provide communication content and material to partner organizations and to coordinate activities to be undertaken by international and national fibre organizations.

FAO proposes to undertake the following activities:

- Maintaining contact and liaising with relevant organizations in various countries, provide encouragement, support and coordination to partner organizations conducting IYNF activities.
- Preparing and disseminating information on the IYNF.
- Developing and maintaining the IYNF website, incorporating promotional material, calendar of events, international partnership.
- Official opening ceremony, 22 January 2009.
- Publication of a book, hold an international conference, on natural fibres.

Organizations with an interest in natural fibres are encouraged to initiate their own events to celebrate 2009. All sorts of events could be arranged - scientific conferences, exhibitions, textile art, publish a book, competitions for kids, etc. In this regard, an International Seminar on Emerging Trends in production, Processing and Utilization of Natural Fibres is being organized during April, 16-18, 2009 at Mumbai under the aegis of Indian Society for Cotton Improvement and Indian Fibre Society. Other initiatives are also being proposed by appropriate authorities to commemorate and encourage use of natural fibres and their renewable qualities .

FRONT LINE DEMONSTRATIONS IN COTTON

Front Line Demonstration (FLD) is one of the powerful tools of extension and is a long term educational activity conducted in a systematic manner in farmers' fields to show the worthiness of a new practice or technology. "Seeing is believing" is the basic philosophy of FLDs. Only proven technologies are therefore selected for FLD in order to educate farmers through results obtained in terms of high yield, good quality, reduction in cost of cultivation and increase in net income. This novel programme is being implemented from 1996-97 onwards for cotton crop to demonstrate cotton production technologies through All India Coordinated Cotton Improvement Project (AICCI) net working centres. Cotton is the major cash crop of India and it faces many challenges. Excess seasonal rainfall and climatic adversities, escalating cost of inputs and labour, damages from insect pests and diseases have emerged as serious limiting factors for



sustainable cotton production. Recent cotton production technologies like high yielding hybrids including Bt cotton hybrids, Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) packages need massive adoption by cotton farmers in stepping up production to targeted levels. FLD programmes assume real importance in the scenario of Transfer of Technology programmes in cotton production.

OBJECTIVES

- ★ To demonstrate the usefulness of the latest improved crop production and protection technologies 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 feedback from cotton farmers and suitably reorient their research programmes and develop appropriate technology packages.
- ★ To create effective linkage among Scientists, Extension Personnel and Farmers.

IMPLEMENTATION OF FLDs

During the year 2008-09, three types of FLDs were conducted all over the country. They were **FLDs on cotton production technology (2300)**, **FLDs on farm implements (24 units)** and **FLDs on cotton IPM (30 units)**. The main emphasis was given to the demonstrations for enhancing the production of cotton in low productivity areas / problematic areas, where total improved package was demonstrated. A list of beneficiaries and their plot numbers were notified in the local Block Development / Panchayat Office. Farmers were selected in consultation with local Agricultural Officers and Panchayat Samiti. These officials formed part of the FLD team. Bench mark survey was conducted before taking up the trial which included information on the crops and cropping system of the area, inter cropping, the average yields of cotton and the local practices adopted in terms of irrigation, use of fertilizer, plant protection, etc., Information on the cost of cultivation was also collected for the area as a whole. An impact analysis after the harvest was carried out in the light of reduction in insecticide use, reduction in cost of cultivation, awareness of modern technology etc., Further in accordance with the decision of Government of India (GOI) regarding implementation of Special Component Plan (SCP) for Scheduled Caste and Tribal Sub Plan (TSP) for Scheduled Tribes and Gender Budgeting, the beneficiaries were selected for the year's front line demonstration programme.

The number of demonstrations allocated centre wise and the budgetary outlay are as follows.

Budget allocation for Front Line Demonstrations in Cotton during 2008-09

S.No.	Centres	FLDs on Production Technology		FLDs on IPM		FLDs on Farm Implements		Total (Rs.)
		No.	Budget (Rs.)	No.	Budget (Rs.)	No.	Budget (Rs.)	
North Zone								
1	PAU, Faridkot	125	250000	2	200000	2	200000	650000
2	HAU, Hisar	125	250000	2	200000	2	200000	650000
3	RAU, Sriganganagar	100	200000	1	100000	1	100000	400000
4	MPUAT, Banswara	100	200000	1	100000	1	100000	400000
5	CICR, Sirsa	50	100000	1	100000	1	100000	300000
North Zone Total		500	1000000	7	700000	7	700000	2400000



Central Zone								
6	NAU, Surat	100	200000	2	200000	1	100000	500000
7	JAU, Junagadh	100	200000	2	200000	1	100000	500000
8	JNKVV, Khandwa	100	200000	2	200000	1	100000	500000
9	JNKVV, Indore	100	200000	1	100000	1	100000	400000
10	PDKV, Akola	150	300000	2	200000	1	100000	600000
11	MAU, Nanded	150	300000	1	100000	1	100000	500000
12	MPKV, Rahuri	100	200000	2	200000	1	100000	500000
13	OUAT, Bhavanipatna	150	300000	2	200000	1	100000	600000
14	CICR, Nagpur	100	200000	1	100000	1	100000	400000
15	IGKV, Raipur	100	200000	-	-	-	-	200000
16	BCKV, West Bengal	100	200000	-	-	-	-	200000
Central Zone Total		1250	2500000	15	1500000	9	900000	4900000
South Zone								
17	ANGRAU, Guntur	100	200000	2	200000	2	200000	600000
18	CRIDA, Hyderabad	100	200000	1	100000	1	100000	400000
19	UAS, Dharwad	150	300000	2	200000	2	200000	700000
20	TNAU, Coimbatore	100	200000	1	100000	2	200000	500000
21	CICR, Coimbatore	100	200000	2	200000	1	100000	500000
South Zone Total		550	1100000	8	800000	8	800000	2700000
Grand Total		2300	4600000	30	3000000	24	2400000	10000000

FLDs on Cotton Production Technology

Under FLDs on Cotton Production Technology, a total of 2300 demonstrations were conducted during the year 2008-09. Each demonstration was conducted in one acre plot. High yielding varieties and hybrids suited for various agro-climatic conditions approved transgenic cotton hybrids, Integrated Nutrient Management (INM), Integrated Pest Management (IPM), use of bio-fertilizers, bio-pesticides, water management, intercropping system, etc., were the production technologies demonstrated through this component. An amount of Rs.2000/- was allocated per demonstration. Out of this, Rs.1400/- was used for essential inputs for demonstration and the rest was utilized for POL, hiring of vehicles, *kisan melas*, printed materials, reports, demonstration boards etc.,

FLDs on IPM in Cotton

In order to popularize the location specific IPM modules, this component was implemented in 30 units. The location specific IPM modules were executed in 10 hectare blocks to 50 hectare blocks.

FLDs on Farm Implements

To popularize the machineries use in cotton cultivation, this component was carried out in 24 units. The area under demonstration was ensured that it should not be less than 25 hectare. Per unit of implement demonstration an amount of one lakh rupees was earmarked. Out of that, Rs.95,000/- was spent on purchase of implements and Rs. 5000/- for the expenditure on demonstration of the implements. No inputs were provided to the beneficiaries under this component.



Details of the technologies demonstrated by the AICCIP centres during 2008-09

Centre	No. of FLDs	Technologies demonstrated
NORTH ZONE		
PAU, Faridkot	PT-125 IPM-2 FI-2	<ul style="list-style-type: none"> ➤ RCH 134 Bt, PAU 626H, LD 694, F 1861, MRC 6304Bt, NCS 950 Bt, MRC 6025 Bt, Raja, RG 8, MRC 6301Bt, LH 2076, RCH 317 Bt, PAU 626, RCH 308 Bt and Moti ➤ Optimal plant population ➤ Balanced nutrition ➤ Time of sowing ➤ Weed control ➤ Improved hybrids/varieties ➤ IPM techniques ➤ Hybrid cotton planter, Disc harrow, Sealer, Plancker, Cultivator, Aero blast sprayer and rotavator.
HAU, Hisar	PT-125 IPM-2 FI-2	<ul style="list-style-type: none"> ➤ Yield maximization of AAH 1, HD 123, HD 324, H 1117 H 1226, RCH 134 Bt, NCS 913 Bt, MRC 6301 Bt, Amar 009 and Nam. Cotton 33. ➤ IPM techniques ➤ Sub soiler and rotavator.
RAU, Sriganganagar	PT-100 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ RCH-134 Bt, MRC-6029 Bt, MRC-6304 Bt, Variety RS-810, RST-9, Raj DH -9, AAH-1, CICR-2 and RG-8 ➤ IPM techniques ➤ Aero blast sprayer
MPUAT, Banswara	PT-100 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ H8 and PA 255 ➤ IPM ➤ Rotary tiller, ridger plough, power weeder, power sprayer, local improved weeder, wheel hoe and tractor mounted high capacity sprayer
CICR, Sirsa	PT-50 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ CICR 2, CISA 310, CSHH 198 ➤ Hybrid seed production of CICR 2 and CSHH 198 ➤ IPM techniques ➤ Rotavator
CENTRAL ZONE		
NAU, Surat	PT-100 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ G.Cot Hy 12, G.Cot Hy 10, G.Cot 23, G.Cot 21, approved Bt cotton hybrids ➤ IPM techniques
JAU, Junagadh	PT-100 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ JK 666, Dhanno 504, Tulsi 117, Ankur akka, Mallika 207, vikram 5, Balwan 207, MRCH 6301, Maruti 9632, Tulsi 4, Alto 377, Ajeet 155, Tulsi 5, Avani 222, GK 205, RCH 2, RCH 2 BG II, Sangram, Mahasangram, Vikram 9 and Tulsi ➤ Application of micro nutrients ➤ Alternate furrow irrigation ➤ Intercropping in cotton ➤ IPM techniques
JNKVV, Khandwa	PT-100 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ RCH 2 BG II, AJEET-155, MECH-162 Bt, VICH-5, MECH 184 Bt, Ganga Kaveri, Brahma, Somnath and MECH-12 Bt ➤ INM ➤ Intercropping with Arhar ➤ IPM techniques
JNKVV, Indore	PT-100 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ GK 205 Bt and RCH 118 Bt ➤ Fertilizer application 150+60+60Kg NPK/ha + 5ton FYM/ha ➤ IPM techniques



PDKV, Akola	PT-150 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ Improved varieties / hybrids ➤ <i>in situ</i> soil moisture conservation ➤ Crop canopy management ➤ Clean cotton pickings ➤ Organic cotton production ➤ Plant spacing ➤ IPM techniques
MAU, Nanded	PT-150 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ 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 ➤ Application of organic manures ➤ IPM techniques
MPKV, Rahuri	PT-100 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ Phule 0688, Mallika Bt, NHH 44, Tulsi Bt, Rudraksh, Kanak and JLA 794. ➤ Integrated Nutrient Management ➤ Integrated Weed Management ➤ Integrated Disease Management ➤ Growing of cotton after harvest of sugarcane ➤ IPM techniques
OUAT, Bhawanipatna	PT-150 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ Tulsi, Atal, Bunny, Gabbar, super bunny, Dhanno, JK Durga, JK Gowri and BS 144 ➤ IPM techniques.
CICR, Nagpur	PT-100 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ NCS 145, Bunny Bt, NCS 145 BG II, MRC 6301 Bt, Maruti and NHH 44. ➤ Dry sowing for yield potential ➤ Weed management ➤ INM ➤ Intercropping with soybean ➤ Foliar application of DAP ➤ Detopping ➤ Opening of ridges and furrows for moisture conservation ➤ Spray of MgSO₄ ➤ Sprinkler irrigation ➤ IPM techniques ➤ Battery operated sprayer
IGKV, Raipur	PT-100	<ul style="list-style-type: none"> ➤ Intercropping ➤ improved varieties and Hybrids ➤ INM ➤ IDM ➤ IPM
BCKV, Mohanpur	PT-50	<ul style="list-style-type: none"> ➤ LRA 5166 ➤ NPK – 80:40:40 ➤ Correct time of sowing, seed rate and spacing



SOUTH ZONE		
ANGRAU, Guntur	PT-100 IPM-2 FI-2	<ul style="list-style-type: none"> ➤ Performance of Bt hybrids with improved technologies viz., high yielding Bt hybrids, modified scheduled of fertilizer and foliar application of multi 'K' ➤ IPM techniques ➤ Rotavator
CRIDA, Hyderabad	PT-100 IPM-1 FI-1	<ul style="list-style-type: none"> ➤ Bunny Bt and JK Durga Bt ➤ Integrated Crop Management ➤ IPM techniques ➤ Manual weeder, Power weeder and rotavator
UAS, Dharwad	PT-150 IPM-2 FI-2	<ul style="list-style-type: none"> ➤ Intercropping with Green gram, Groundnut and Beans ➤ Split application of nutrients and foliar nutrition ➤ Integrated crop management in Bt-cotton ➤ Nutrient management and foliar nutrition in Bt cotton ➤ Performance of Bt-cotton genotypes ➤ Management of square shedding and leaf reddening ➤ Stem application + Mirid bugs and PBW management ➤ Sucking pest management and foliar nutrition ➤ Management of foliar diseases/Nutrition management ➤ Genotype demonstrations with recommended package. (RAHS-14 V/s Jayadhar) ➤ Demonstrations on performance of DDhc-11 (<i>G. herbaceum</i>) over Jayadhar ➤ IPM in Bt cotton ➤ DDhc 11, RAHS-14 ➤ Square shedding and leaf reddening in Bt-cotton ➤ Management of foliar diseases ➤ Stem application + Mirid bugs and PBW management ➤ 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
TNAU, Coimbatore	PT-100 IPM-1 FI-2	<ul style="list-style-type: none"> ➤ Bunny Bt, RCH 2 BG II, KC 3, SVPR 2, PA 255, K 11 and KC 2 ➤ Maintenance of adequate population ➤ Stem weevil management ➤ Intercropping ➤ IPM techniques
CICR, Coimbatore	PT-100 IPM-2 FI-1	<ul style="list-style-type: none"> ➤ Bt cotton hybrids RCH 2Bt, RCH 20Bt, RCH 530 Bt BG II with improved technologies ➤ ICM on DCH 32 ➤ INM ➤ Intercropping ➤ IPM techniques ➤ Power weeder

Cropping System Approach for sustainable yields

In variance to the monocropping of cotton and the concept of cotton belts in the American and European countries, Cotton cultivation in India, especially for the rainfed areas, is always a combination of mixed cropping and intercropping. In the irrigated areas and high rain fall zones, cotton is grown in sequential cropping as double or triple cropping sequences and in extreme cases going in for intensive relay cropping. Such a varied inter, mixed and relay



cropping scenario in the cotton based cropping systems, gives a mosaic of varied cropping systems ensuring stable yields and avoiding crop failures. The incidences of pests and diseases assume less serious proportions only because of such diversified cropping systems. **Classical Intercropping Systems that have been evaluated under AICCIP trials** can be successfully adopted and disseminated to farmholdings for sustainability, enhanced profitability and maintenance of soil health besides better yields year after year.

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 have 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 them shall be discussed during the Annual Group Meeting for follow-up action.

STATE/AREA	Team members	Institution	Discipline
Punjab	Dr. C. J. Kapoor Dr. P. L. Nehra Dr. Vichiter Singh Dr. D. Monga	RAU, Sriganaganagar RAU, Sriganaganagar RAU, Sriganaganagar CICR, RS, Sirsa	Breeding Agronomy Entomology Pathology
Haryana & Rajasthan (Sriganaganagar)	Dr. J.S.Gill Dr. E. Narayana Dr. P. Jeyakumar Dr. Daljeet Singh	PAU, Faridkot ANGRAU, Guntur NCIPM, New Delhi PAU, Faridkot	Breeding Agronomy Entomology Pathology
Gujarat and Banswara of Rajasthan	Dr. S. S. Bhatade Dr. S. K. Khamparia Dr. P. R. Zawar Dr. P. P. Shastry	CRS, Nanded JNKVV, Khandwa CRS, Nanded JNKVV, Khandwa	Breeding Agronomy Entomology Pathology
Madhya Pradesh	Dr. S. Manickam Dr. K. Sankaranarayanan Dr. G. M. V. Prasad Dr. S. N. Chattannavar	CICR, RS, Coimbatore CICR, RS, Coimbatore ANGRAU, Guntur UAS, Dharwad	Breeding Agronomy Entomology Pathology
Maharashtra	Dr. R. K. Patnaick, Dr. M. V. Venugopalan Dr. S. M. A. Mandal Dr. Jagdish Beniwal	OUAT, Bhawanipatna CICR, Nagpur OUAT, Bhawanipatna CCS HAU, Hisar	Breeding Agronomy Entomology Pathology
CICR, Nagpur & Bhawanipatna (Orissa-Only AICCIP trials)	Dr. M.Gopinath Dr. V. Kumar Dr. S. Mohan Dr. H.J.Kapadia	ANGRAU, Guntur NAU, Surat TNAU, Coimbatore JAU, Junagadh	Breeding Physiology Entomology Pathology
Andhra Pradesh	Dr. S. S. Siwach Dr. A.R.Aladakatti Dr. S. B. Patil Dr. P.V.Patil	CCS HAU, Hisar UAS, Dharwad UAS, Dharwad NAU, Surat	Breeding Agronomy Entomology Pathology
Karnataka	Dr. S.Rajaratnam Dr. K. Rajendran Dr.S.Mohan Sh. U. V. Ingole	TNAU, Coimbatore TNAU, Coimbatore TNAU, Coimbatore Dr.PDKV, Akola	Breeding Agronomy Entomology Pathology
Tamil Nadu	Dr. M.S.Gill Dr. Parminder Kaur Dr. Rishi Kumar Dr.P.S.Sekhon	PAU, Ludhiana PAU, Ludhiana CICR, RS, Sirsa PAU, Ludhiana	Breeding Agronomy Entomology Pathology



Maintenance of Nucleus and Breeder Seeds:

An effective maintenance of Nucleus and Breeder Seeds programme was undertaken during 2008-09 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 has been taken up at ten centres of State Agricultural Universities and two ICAR centres. A total quantity of 1.31 quintals of Breeder seeds of parental lines and 84.90 quintals of varieties have been indented.

ELS COTTON

In order to give impetus to enhanced production of ELS Cotton and significant improvement in the productivity of ELS Cotton in India, several R & D efforts have been taken up by the ICAR in the recent past including the current year 2008-09.

Transgenic Bt cotton ELS hybrids:

Transgenic Bt cotton ELS hybrids developed by Private sector R&D seed firms viz., MRC 6918 & MRC 7918, MRC 7929 (Mahyco), RCHB 708 Bt (Rasi seeds), Kashinath (Nath Seeds), SP 904 B1 (Bayer Biosciences), NCHB 940, NCHB 945, NCHB 991, NCHB 992 (Nuziveedu seeds), JK Chamundi (JK Agrigenetics), PRCHB 405 (Pravardhan Seeds), VBCHB 1010 Bt, VBCHB 1203 Bt (Vibha Seeds) have all been evaluated in multilocation centres of AICCIP under coded ICAR Bt trials for their yielding ability, fibre quality attributes and pest/disease reaction. **Based on ICAR evaluation trials**, these hybrids have since been permitted by GEAC for commercial cultivation in the Central and /or South zone States. The large scale cultivation shall contribute towards increased ELS cotton production in the coming years.

Improved ELS Cotton production packages: Existing ELS Cotton variety and interspecific hybrids including transgenic ELS cotton hybrids have been extensively studied at many AICCIP centres and CICR Regional Station at Coimbatore for effective agronomic and crop management practices. The integrated nutrient, water and weed management strategies have all been worked out and the packages have also been demonstrated in Farmers' fields through Front Line Demonstration in Cotton, wherein improved yields have been conclusively demonstrated with higher net benefits. Large scale demonstrations have also been initiated during 2008-09 season through NAIP scheme of CIRCOT, Mumbai at CICR, Regional Station, Coimbatore on Cotton Value Chain to demonstrate the usefulness of cotton value chain, byproduct utilization, value addition etc in respect of ELS Cotton. All these measures are expected to act as a stimulant for further expansion in ELS cotton area and productivity leading to overall improvement in ELS cotton production to meet national needs in coming years and save foreign exchange.

Notification of Cotton genotypes for cultivation

During the year, Cotton varieties/hybrids viz., Suraj (CCH 510-4), RAS 299-1, DDhc-11, DHH 543 (Suvidha) have been notified for seed production and cultivation in specific eoniches after extensive testing in AICCIP and respective SAUs.



Progress of Implementation of PVP legislation 2001

As a nodal centre of cotton for Implementation of PVP legislation 2001, several important activities were undertaken. Proposals for the registration of extant cotton varieties were prepared for which breeders from north zone, central zone and south zone centers were called in July 2008 and an awareness meeting was organized at PC's Cell, AICCIP, Coimbatore. As a first phase, 25 application forms comprising of new and extant varieties were submitted to PPV&FRA through NBPGR New Delhi. Three new varieties have been accepted for conduct of DUS test during Kharif 2009. The registration of remaining extant varieties is in progress at PPV&FRA. Certain queries from PPV&FRA related to the registration proposals have been answered and the registration certificate are expected in due course.

Another important mandatory requirement of Implementation of PVP legislation is the conduct of DUS trials of new cotton varieties. A pilot trial with three *Gossypium hirsutum* and two *G. barbadense* candidate varieties along with 15 reference varieties were conducted during winter 2008 season simultaneously at CICR, Regional Station, Coimbatore and the National Seed Project centre of UAS, Dharwad. A monitoring team under the Chairmanship of Dr.A.K.Basu (Ex-Director, CICR) was constituted and the committee visited the trials on 26th and 28th of November, 2008 respectively at CICR, Coimbatore and UAS Dharwad. Dr.S.Nagarajan, Chair person of PPV&FRA also visited the DUS trial plots along with the monitoring team. An exercise is under way to conduct DUS trails of cotton in all the five notified DUS centers viz., CICR, Coimbatore, CICR, Nagpur, UAS Dharwad, CCSHAU Hisar and PAU Ludhiana during Kharif 2009. Apart from this, maintenance breeding and seed multiplication of 145 extant references were undertaken during 2008-09 and the seeds of these varieties are available for distribution to other centers as a reference variety for conducting DUS trials in future.

Tasks Ahead – Visionary role with Missionary zeal for AICCIP again emphasized

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, mirid 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.*
- *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*
- *Efficient crop management strategies, successful extension of INM and water harvest programme and fine tuning of IPM approaches 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 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.*
- *Insecticide Resistance management strategies with better options of IPM with Bt cotton hybrids and INM that have been generated by CICR/TMC MM II need to be further popularised through FLDs under the supervision of AICCIP personnel*
- *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 for replication in a location specific manner.*

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 matter to the clientele. All stakeholders are requested to post information on cotton and related issues to the Project Coordinator (Cotton improvement) & Head, Central Institute for Cotton Research, Regional Station, Coimbatore so that the same can be incorporated on the basis of need in official website of CICR and AICCIP viz. www.cicr.org.in, which is periodically updated for the benefit of all stakeholders.

