All India Coordinated Cotton Improvement Projects

PROJECT COORDINATOR'S REPORT: 2001-02

INTRODUCTION

Indian economy continued to receive great support from the most important commercial crop of the country, Cotton, known as the **"king fibre"** world over. **The country has earned Rs.55, 000 crores in foreign exchange during 2000-01 by export of cotton fibre, yarn and textiles,** registering an increase of about Rs.11, 000 crores over the previous year.

India as exporting 13-16 lakh bales of raw cotton (cotton lint) during 1995-97. However, the country became a net importer during last two years and cotton fibre import was to the tune of 18 lakh bales from USA, Australia, China and other countries for manufacture of yarn and its export. The import was mainly due to cost advantage, i.e., a lower price for the old stock of cotton, which these exporting countries have accumulated and credit facility with no interest up to six-months. Initially, it was reported that the imported cottons were uniform in staple length and had other good fibre qualities; but the recent feed back from the industry has revealed **that the imported cottons also suffer in terms of quality (weak and sticky cotton) and underweighments.** It is also a fact that cotton farmers from the above exporting countries are receiving substantial export subsidy, without which these countries can never afford to have any cotton export. Hence, it is time that the Government of India takes appropriate policy decisions to support Indian cotton farmer with appropriate **export subsides and credit facilities for adoption of 'Hi-Tech' farming.**

WORLD COTTON SCENARIO

The cotton production during 2001-02 showed a marginal increase to 21.09 million metric tones from 19.27 million metric tones recorded during the previous year. Similarly, there was a marginal increase in area and productivity (Table 1). China continuous to occupy the first place, with a total production of 5.3 million metric tones, as against 4.37 million metric tones of USA. While Pakistan registered a declining trend in production and productivity, India more or less maintained its production and productivity

Table 1. World cotton statistics

	Area (m.ha)		Production (m. Metric tonne)		Productivity (Kg/ha)	
	2000-01	2001-02	2000-01	2001-02	2000-01	2001-02
China	4.05	4.82	4.42	5.31	1089	1102
USA	5.28	5.59	3.74	4.37	708	782
India	8.12	8.74	2.37	2.57	292	294
Pakistan	2.93	3.13	1.79	1.70	610	543
Others	11.57	11.70	6.95	7.14	-	-
World	31.95	33.98	19.27	21.09	603	621

Source: USDA report, Feb.2002

INDIAN COTTON SCENARIO

Cotton Area and Production

Cotton area and production is estimated to be around 85.6 lakh hectares and 156 lakh bales, respectively during the current year (Table 2, 3 and 4).

Table 2: State-wise Cotton Area (Lakh hectares) during the last ten years

State	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	2001-02
Punjab	6.90	7.01	6.06	7.50	7.42	7.02	5.47	4.75	5.5	6.0
Haryana	5.43	4.90	5.52	6.46	6.49	6.55	5.87	5.10	5.8	6.10
Rajasthan	4.71	4.55	4.61	6.06	6.54	5.80	6.38	4.64	4.82	3.47
Gujarat	12.46	9.21	13.28	14.10	15.24	14.58	16.97	15.16	15.78	16.87
Maharashtra	24.80	27.30	27.6	30.70	30.90	31.00	31.99	32.53	27.93	29.80
Madya Pradesh	4.80	6.08	5.75	5.37	5.27	5.48	5.32	5.41	5.57	6.23
Andhra Pradesh	7.33	6.55	7.28	10.57	10.07	8.50	10.03	9.09	8.87	10.02
Karnataka	5.72	5.96	5.96	6.74	6.68	6.00	6.09	5.29	5.35	5.11
Tamil Nadu	2.71	2.39	2.72	2.65	2.60	2.65	2.20	2.50	1.33	1.60
Others	0.48	0.45	0.43	0.53	0.50	0.50	0.80	0.81	0.53	0.73
Total	75.34	74.4	79.21	90.68	91.71	88.08	91.12	85.28	81.48	85.93

Table 3: State-wise Cotton Production (Lakh bales) during the last ten years

State	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	2001-02
Punjab	21.88	13.96	14.50	14.35	16.00	7.50	5.50	9.50	11.50	9.00
Haryana	14.09	9.88	11.54	11.30	13.50	9.00	7.50	11.0	11.50	6.50
Rajasthan	10.88	11.11	9.92	13.75	15.00	11.50	12.00	12.5	11.50	6.50
Gujarat	22.30	19.76	26.59	31.25	34.25	42.00	45.00	35.0	27.00	34.00
Maharashtra	20.34	14.65	15.84	28.75	33.00	20.50	25.00	38.0	24.00	34.00
Madhya Pradesh	10.03	14.21	15.85	14.25	18.75	23.00	20.00	15.0	17.50	15.00
Andhra Pradesh	22.18	24.55	28.36	27.35	26.50	24.75	25.00	23.0	26.00	27.00
Karnataka	10.84	8.41	9.30	9.50	9.00	7.50	8.50	8.0	9.00	8.00
Tamil Nadu	6.46	5.72	6.00	5.00	5.50	5.50	5.50	5.5	5.50	5.50
Others	1.00	1.00	1.00	1.00	1.00	1.00	1.25	1.50	1.50	1.50
Loose supply	-	-	-	-	5.00	5.75	6.25	8.0	8.00	9.00
Total	140.0	123.3	138.9	156.5	176.5	158.0	161.5	167.0	153.00	156.00

Table 4. State-Wise Cotton Productivity (kg lint /ha) during the last ten years

State	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	2001-02
Punjab	539	339	407	325	367	182	171	340	355	255
Haryana	441	343	355	297	353	234	217	367	337	181
Rajasthan	393	415	366	386	364	337	320	458	406	318
Gujarat	304	365	340	377	382	490	451	392	290	342
Maharashtra	139	91	98	159	182	112	133	199	145	194
Madhya Pradesh	355	397	469	451	605	714	639	471	534	409
Andhra Pradesh	514	637	662	440	447	495	424	430	498	458
Karnataka	322	240	265	240	229	213	237	257	286	266
Tamil Nadu	405	407	375	321	360	353	425	374	703	584
Mean	315	281	298	293	327	305	266	333	319	309

Mean production data for the last five years indicated that the production has stabilized around 160 lakh bales. (Table 5)

Table 5. Mean cotton area and production data for the last five years (1996-97 to 2000-01)

State	Area (lakh ha)	Production (lakh bales)	Yield (kg/ha)
Punjab	5.96	90.2	267
Haryana	5.97	10.2	290
Rajasthan	6.02	12.1	345
Gujarat	15.49	35.4	389
Maharashtra	30.94	27.9	153
Madhya Pradesh	5.25	18.5	601
Andhra Pradesh	10.22	25.0	424
Karnataka	5.86	8.4	243
Tamil Nadu	2.21	5.4	429
Others	0.62	1.2	341
Loose supply	-	7.2	-
Total	88.54	160.4	308

Source: CAB

SEASON & CLIMATE

The season and climate was unfavorable in majority of cotton growing regions in the country (Fig. 1-3). In the North zone, frequent showers during the early season (May-June) induced heavy bollworm incidence. Inadequate rain during later parts affected storage level of the reservoirs, which in turn affected the irrigation needs of the crop. The crop in Haryana and Rajasthan was worst affected, due to non-availability of irrigation water and terminal drought. Similarly, the drought was severe in Gujarat, Maharashtra and parts of Andhra Pradesh, where the crop faced terminal drought from August to

September. On the other hand, **heavy rains experienced in Southern Andhra Pradesh and Tamil Nadu during October and November created flooding and inundation** of cotton fields. The late rains during October in parts of Maharashtra were however a boon to cotton crop, helping in rejuvenation and thereby giving additional seed cotton crop, helping in rejuvenation and thereby giving additional seed cotton yields. However, due to prolongation of crop duration, the fibre quality was affected.

PESTS AND DISEASES

During the current season, the North Zone States viz., Punjab, Haryana and Rajasthan witnesses a serious and unprecedented outbreak of cotton bollworms, especially Helicoverpa armigera. These States experienced **severe epidemics of cotton bollworm and the crop damage was reported to be as high as 60% in Rajasthan, 40% in Haryana and 27% in Punjab.** The pre-disposing factors for the pest out break and remedial measures suggested by the Central Team constituted to investigate cotton failure in North Zone States are given in detail in the chapter on Entomology. The excessive use of synthetic Pyrethroids and mindless calendar sprays of pesticide mixtures were known to be the major reasons for the cotton failure. This problem has to be tackled through appropriate Policy interventions, Regulations and Extension activities.

Andhra Pradesh, Tamil Nadu, Gujarat and Maharashtra States also witnessed severe incidence of bollworms. Pink bollworm damage is on the increase in Southern States, especially Karnataka and Tamil Nadu. Two of the pesticide molecules, Indoxocarb and Spinosad were found effective for the control of bollworms. These two pesticide molecules have been validated under AICCIP system and are also licensed for marketing. Adequate supply of these chemicals has to be ensured throughout the country.

During the year under report, none of the diseases posed any serious problem in any part of the country. It is gratifying to note that even the most dangerous Cotton Leaf Curl Virus disease was very much under control in North zone states. Research on development of CLCV resistant varieties and hybrids has been intensifies and the screening techniques are updated with necessary green house / lab facilities.

COST OF CULTIVATION

A plea is often made in the national seminars, newspapers and media that **Indian farmers have to reduce the cost of cotton cultivation to make cotton cultivation more remunerative. But the fact is that the cost of cultivation is the least in India,** compared to all other cotton growing countries. There is scope to reduce cost only on pesticides input, but for following “area wide” adoption of IPM and INM for Hi-Tech farming, the cost will definitely be increasing. **Introduction of Transgenic “Bt Cotton” for control of the major pest viz., cotton bollworms** may substantially bring down the

cost of cultivation. **It is estimated that Rs.3400 crores is spent on pesticides for the control of cotton bollworms.**

Quality of Indian Cotton

The Indian cotton is always blamed for its poor quality. During the British period from 1850 to 1947, the country was growing only Desi cotton, which was supposed to be of poor quality but was totally utilized by the Britishers for their global trade, thus, earning substantial profits. Since 1950, the area under quality cotton *(G.hirsutum)* is on the increase from 30 to 70%. With the release of several varieties / hybrids with long and extra long staple there should be appreciation, for the improvements made in Indian cotton. The trash content is higher only in *G.herbaceum* cotton, which is grown in parts of Gujarat (5% of area) due to inherent species deficiency. The other Indian cottons have the barest minimum trash content, as they are hand picked. **The deficiencies in pre-cleaning, ginning, pressing and rough handling at market yards are the major reasons for contamination and for this cotton farmers and R & D are often blamed.** In other cotton growing countries, the cotton is pre-cleaned and processed before and after ginning to remove trash and dirt and then pressed into bales of high quality; whereas **Indian cotton is handled in a very rough way without any strict regulation on pre-cleaning and baling as per standard quality norms.** It is high time that the Cotton Trade, Ginning and Processing Industries in India wake up to reality and modernize their Ginning and Pressing factories. Contamination appears to be a tactics to reduce the cotton price and erode the profit margin of the cotton farmer. The Textile Industry after purchasing cotton bales from Ginners and Traders, do clean and process the cotton for making high quality yarn suitable for export. It is worthwhile to recall that **India has emerged as a leading yarn exporter globally since 1996-97 and the fact certifies for Indian cotton quality.**

It is also quoted in the press that many Textile Mills are closing down for want of quality cotton or due to increasing cost price of raw cotton. However, the real reason for the closure of textile mills appears to be due to increased overhead costs and the labour problems. The number of Textile and Spinning Mills actually are increasing over the years and their total capacity is much more than the internal needs and potential for Export.

Fibre Quality Norms

The CIRCOT has communicated the new fiber quality norms and recommended for screening / evolving future varieties and hybrids based on the new norms (Table 6). It would be better to have a brain storming session on this aspect, before adopting the new norms. Cotton fibre is a biological product and the correlation of various fibre parameters like staple length, strength, elongation etc with yield and other agronomic characters has to be kept in mind while considering the norms for plant breeding. Staple length and

elongation may be the parameters negatively correlated. The correlation between high strength and yield needs a critical review. Besides, for yarn counts of 10 to 30 range, strength beyond 18-20 g/tex may not be needed and that too when longer staple cottons are under spun in majority of Indian textile mills. Under these circumstances, it is also essential to compare the new norms proposed with existing fibre quality norms followed by the other cotton growing countries as USA and China. CIRCOT should make the above norms available and should arrange for a **"Brain storming session on fibre quality norms"** inviting eminent cotton breeders, physiologists and biochemists of the country.

Table 6: Fibre Quality Norms for Breeding – ICMF / CIRCOT Recommendation

Yarn Count	2.5% Span Length (mm)	UR (%)	Mic Value	Tenacity (g/t)	Elongation (%)	Maturity Pm (%)	CSP
6s-20s	22.25	50	4.0-5.0	20-22	6.0	80	2400
21s-30s	26.27	50	3.8-4.8	22-23	6.0	80	2500
31s-40s	28.30	50	3.8-4.5	24-25	6.0	80	2600
41s-50s	30.31	50	3.5-3.8	25-27	6.0	80	2800
51s-60s	31.33	50	3.3-3.5	27-28	7.0	75	2900
61s-80s	33.35	50	3.2-3.4	28-30	7.0	75	3000
81s-100s	36.38	50	3.2-3.4	30-32	7.0	75	3200
101s-120s	36.38	50	3.2-3.4	30-32	7.0	75	3400

PRIVATE SECTOR PARTICIPATION

Since 1990, there is a growing involvement of Private Seed growers in cotton Research & Development. Earlier to this period, except for one or two firms like **Mahyco** and **Nath Seeds,** other firms were involved only in seed production and sales. **Since 1990, many seed growers have developed their own Research & Development establishments and are developing their own brand of hybrids,** competing with public bred hybrids. The number of firms giving hybrid entries since 1995 increased gradually and right now there are as many as 48 seed growers with recognized R&D (DST) facility, offering hybrid entries for testing under the AICCIP Programme. It means that the cotton breeders involved in Plant Breeding research is more than doubled in the country as there are about 25 cotton breeders working in Public institutions and about 50 cotton Breeders working in Private Sector. For the country, as a whole, this is a happy situation. Collaboration between public and private institutions should auger well for substantial yield improvement beside quantum jump in hybrid cottonseed production. **The acid delinted and chemically treated hybrid cotton seeds offered in standard packets of 450g. each in air-tight quality packing materials (automatic packing) is of International quality.** It is also a happy situation that a **few private seed firms are in a position to export hybrid cotton seeds.** If the lead is rightly strengthened, hybrid seed

cotton export would also be a source of greater revenue both to the Government and cotton seed growers of the country.

Many of the leading Private seed growers are testing their hybrids in AICCIP and after valid testing, get their hybrids identified, released and notified by ICAR and Government of India. This should pave the way for eliminating spurious hybrid seeds from entering the market. Feedback from cotton seed trade indicates that F2 seeds are also being openly sold in the market. The seed certification agencies in all the concerned States may take appropriate legal measures to curb the sale of F2 seeds in sustaining hybrid cotton cultivation and in maintaining cotton fibre uniformity.

As many as 41 varieties / hybrids have been released and notified for commercial cultivation during the last five years. The list of varieties and hybrids released by Public and Private Research & Development Agencies are listed in Table 7.

Table 7: List of Varieties/ Hybrids released during last five years

Sl.No.	Variety / Hybrid	Year of release	Released by	Area of adoption
G.hirsutum				
1	Surabhi	1997	CICR,Coimbatore	South Zone
2	SVPR 2	1997	TNAU, Coimbatore	South Zone
3	H 1998	1997	CCS HAU, Hisar	Haryana
4	Pusa 8-6	1997	IARI, New Delhi	North Zone
5	F 1378	1997	PAU, Ludhiana	Punjab
6	KC 2	1997	TNAU, Coimbatore	Tamil Nadu
7	Narasimha	1998	ANGRAU, Guntur	Andhra Pradesh
8	Sumangala	2000	CICR, Coimbatore	Irrigated tracts of South Zone
9	SVPR 3	2000	TNAU, Coimbatore	Rainfed tracts of Tamil Nadu
10	MCU 12	2000	TNAU, Coimbatore	Winter irrigated tracts of Tamil Nadu
11	L 603	2000	ANGRAU, Guntur	Andhra Pradesh
12	L 604	2000	ANGRAU, Guntur	Andhra Pradesh
13	Sahana	2000	UAS, Dharwad	Karnataka
14	RS 810	2000	RAU, Sriganganagar	Rajasthan
15	ICMF 20	2000	ICMF, Nandyal, A.P.	Southern Andhra Pradesh
16	RAMPBS 155	2000	UAS, Dharwad	Irrigated tracts of Karnataka
17	Aravinda	2000	ANGRAU, Guntur	Rayalaseema District of. Andhra Pradesh
18	G.COT. 18	2000	GAU, Surat	Gujarat
19	Pratima	2001	CICR, Nagpur	Irrigated tract of South Zone

Intra hirsutum Hybrid				
20	JK Hy.2	1997	JNKVV,Khandwa	Madhya Pradesh
21	Om Shankar	1997	CICR, Sirsa	North Zone
22	DHH 11	1997	UAS,Dharwad	Karnataka
23	LHH 144	1998	PAU,Ludhiana	North Zone
24	LAHH 4	2000	ANGRAU,Guntur	Andhra Pradesh
25	PHH 316	2000	MAU,Parbhani	Maharashtra
26	PKV Hy.4	2000	Dr.PDKV, Akola	Maharashtra
Private R& D				
27	Ankur 9	1998	*Ankur Seeds, Nagpur*	Maharashtra
28	RCH 2	1999	*Rasi Seeds, Athur*	Andhra Pradesh
29	*VICH 9*	2000	*M/S Vikram Seeds*	Gujarat
30	Bunny	2001	*M/S. Nuzuveedu Seeds, Guntur*	South Zone
Interspecific Hybrids				
31	Sruthi	1998	CICR,Coimbatore	South Zone
Private R & D				
32	NBHB 11	1997	*M/S. Navbharat Seeds, Ahmedabad*	Central Zone
33	NFHB 109	1998	*Nath Seeds, Aurangabad*	Central Zone
G.arboreum				
34	K 11	1997	TNAU, Coimbatore	Tamil Nadu
35	HD 123	1999	CCS HAU, Hisar	Haryana
36	GAM 31	2000	GAU, Gujarat	Drought prone tracts of Gujarat
37	RG 18	2000	RAU,Sriganganagar	Rajasthan
38	AKA 7	2001	Dr. PDKV, Akola	Maharashtra
G.herbaceum				
39	Vagad Kalyan	2001	GAU, Surat	Gujarat
40	G.Cot.21	2001	GAU, Surat	Gujarat
Intra arboreum hybrid				
41	AAH 1	1999	CCS HAU, Hisar	North Zone

Release Proposals Received for Varietal Identification

It is pertinent to mention here that the All India Coordinated Cotton Improvement Project conducts Varietal Identification Committee meeting during annual group meeting under the chairmanship of the Deputy Director General (Crop Sciences), ICAR, New Delhi, wherein the proposals for identification of new hybrids / varieties are evaluated and if found suitable are appropriately recommended for location specific release. During the current year, as many as 12 hybrid release proposals (3 from Public Sector Institutions and 9 from the Private Sector) have been received and submitted to the High Power Varietal Identification Committee for consideration. The details are as below:

S.No	Hybrid	Sponsored by	Kind	Zone for which proposed
1.	CINHH 109	Central Institute for Cotton Research, Nagpur	Intrahirsutum hybrid	Central
2.	DHH 593	University of Agrl. Sciences, Dharwad	Intrahirsutum hybrid	South
3.	NSPHH 5	Acharya N.G. Ranga Agrl. University, Lam, Guntur	Intrahirsutum hybrid	South
4.	PAC 101	M/s. Advanta India Ltd., Bangalore	Intrahirsutum hybrid	Central
5.	PAC 133	M/s. Advanta India Ltd., Bangalore	Intrahirsutum hybrid	Central
6.	KDCHH 32	M/S. Krishidhan Seeds, Jalna	Intrahirsutum hybrid	Central
7.	NCHH 91	M/S. Nuziveedu Seeds Ltd., Guntur	Intrahirsutum hybrid	South & Central
8.	NCHH 207	M/S. Nuziveedu Seeds Ltd., Guntur	Intrahirsutum hybrid	South
9.	SNSCH 99	M/S.Sri Nagarjuna Seeds (P) Ltd., Guntur	Intrahirsutum hybrid	South
10.	NFHH 95/464	M/S. Nath Seeds, Aurangabad	Intrahirsutum hybrid	Central
11.	MDCH 222	M/S. Maharashtra Hybrid Seeds Co. Ltd., Jalna	Intra arboreum	Central
12.	ADCH 1	M/S. Ankur Seeds, Nagpur	Intra arboreum	Central

TESTING OF Bt COTTON HYBRIDS

During the current season, the Bt cotton hybrids developed by "M/s. The Mahyco Monsanto Ltd., Viz., MECH 184, 162 and 18 were tested in 11 locations of the AICCIP testing centers in central and south zone States. The results indicated that Bt cotton hybrids expressed significant resistance to bollworm attack and proved to be one of the most potential tools in cotton IPM in minimizing cost on pest control and in saving cotton crop from bollworm damage. **The summary and conclusion on Bt cotton trials conducted under AICCIP system during 2001-02 is given in the Chapter on Entomology.**

BREEDER SEED PRODUCTION

Breeder seed production to meet the national and state indents is a major activity under the project. For the first time, incentives for the production and supply of breeder seed were provided for under Research have accorded sanction for an amount of Rs. 9,32,000 to be distributed to various seed production centres. All the seed production centres under the AICCIP would be getting this incentive shortly.

During the year 2001-02, as against a national indent of 138.27 q of Breeder seeds of National varieties and Parents of Hybrids, a total quantity of 187.69 q have been produced by various centres.

All India Coordinated Cotton Improvement Project Breeder Seed Indent and Production				
Sl. No	Name of Variety / Hybrid	Name of Producing centre	2001-02	
			Indent (q)	Production (q)
Parents of Hybrids				
1	LHH 144 (Ajit)	PAU, Ludhiana		
	Female		0.10	NA
	Male		0.03	NA
2	LDH 11	PAU, Ludhiana		
	Female		0.10	NA
	Male		0.03	NA
3	Hybrid 6	GAU,Surat		
	G.Cot. 100(F)		0.14	2.70
	G.Cot.10(M)		0.08	1.80
4	Hybrid 8	GAU,Surat		
	G.Cot.10(F)		0.40	1.20
	Surat Dwarf(M)		0.23	1.80
5	Hybrid 10	GAU,Surat		
	BC 68-2 (F)		0.31	6.90
	LRA 5166 (SB)		0.13	3.20
6	PKV Hy.2	PDKV,Akola		
	AK 32 (F)		0.29	0.08
	DHY 286 (M)		0.15	0.29
7	NHH 44	MAU,Nanded		
	BNI (F)		1.77	2.00
	AC 738 (M)		0.99	1.00
8	DCH 32	UAS,Dharwad		
	DS 28 (F)		1.93	1.70
	SB 425 YF (M)		1.29	1.50
9	Varalaxmi	UAS,Dharwad		
	Laxmi		0.37	0.50
	SB 289 E		0.18	0.20
10	DHH 11	UAS,Dharwad		
	CPD 423		0.05	0.05
	CPD 420		0.05	0.05
11	Savita,	CICR,Coimbatore		
	T7		0.66	0.50
	M 12		0.36	0.30
Varieties				
1	B.Nerma,	RAU, Sriganganagar	6.40	8.00
2	RST 9	,,	13.16	9.00

3	RS875	,,	2.85	2.10
4	RS 810	,,	8.15	10.00
5	Ganganagar Ageti	,,	0.45	1.00
6	RG 8	,,	18.35	36.50
7	RG 18	,,	0.80	1.70
8	F 505	PAU, Ludhiana	6.45	2.50
9	F 846	,,	10.49	10.49
10	F 1054	,,	2.65	1.20
11	F1378	,,	5.30	5.30
12	LH 900	,,	4.66	0.00
13	LH 1556	,,	5.55	5.55
14	LD 327	,,	4.70	3.00
15	H 777	HAU, Hisar	1.48	1.00
16	H 974	,,	0.06	0.12
17	H 1098	,,	5.02	10.78
18	HS 6	,,	5.70	17.00
19	Pusa 8-6	IARI, New Delhi	0.25	0.50
20	Vikas,	CSAUAT, Kanpur	1.00	NA
21	Y-1	GAU, Surat	1.45	0.00
22	Rajat	PDKV, Akola	2.37	7.00
23	LRA 5166	CICR, Coimbatore	8.67	9.00
24	LRK 516	,,	5.50	6.00
25	MCU 5 VT	,,	2.66	2.00
26	Surabhi	,,	1.51	1.50
27	Supriya	,,	0.60	0.60
28	MCU 5,	TNAU, Coimbatore	0.35	0.50
29	Narasimha	ANGRAU, Guntur	1.60	2.00
30	Aravinda	,,	0.10	1.00
		Hybrid Total	9.64	26.47
		Variety Total	128.63	161.22
		Grand Total	138.27	187.69

OTHER RESEARCH AGENDA

In addition to the mandatory research work under AICCIP, various other research activities under **NATP** and **Technology Mission on Cotton** have become additional responsibilities to the AICCIP scientists. In addition to these programmes, AICCIP Centres are also involved in undertaking certain time bound projects of the ICAR under Ad-hoc project scheme and under Competitive Grant system.

Additional responsibilities are being carried out as well, thanks to the provision of contingent funds, equipments and Research Associates. However, the AICCIP centers need certain improvement in infrastructure and vehicle facilities, which are totally lacking in majority of the AICCIP centers.

TRANSFER OF TECHNOLOGY

Since 1995, the AICCIP became the nodal agency for conducting FLD programme of the ICAR, funded by the Ministry of Agriculture, Government of India. It is worthwhile to mention that the Agricultural Finance Corporation Ltd. which has taken up evaluation of the project of "FLD programme" conducted by AICCIP under the directives of the Ministry of Agriculture had appreciated the commendable performance. The INM/IPM practices along with the hybrids and high yielding cotton varieties demonstrated through FLD had resulted in yield improvement to the tune of 15-30% at farmers' fields (Table 8). The detailed programme and achievements of the FLDs are given under the Chapter on Transfer of Technology.

Table 8. Superior performance under Front Line demonstrations

Variety	Yield (kg/ha)		Increase over check (%)
	Demonstration plot	Framer's plot (check)	
F 846	15.0	11.7	28.2
F 1378	18.5	15.3	20.4
RST 9	15.4	13.3	15.4
HS 6	14.3	12.0	19.5
VIKAS	8.7	6.0	43.6
G Cot 16	11.8	10.6	11.4
H 10	22.3	16.9	32.0
DHH 11	21.5	13.8	56.0
NHH 44	9.7	7.6	28.0
Savitha	11.7	9.0	29.0
PKV. Hy.4	12.9	9.8	30.8
DHB 105	19.2	14.7	30.0

GENERAL POLICY ISSUES

Area wide IPM programme: IPM demonstrations conducted at individual holding are found ineffective and unconvincing. Hence, large scale area-wide IPM programmes comprising a group of villages, preferably at Taluk level should be thought of in focusing all R & D efforts. The FLD programme of AICCIP can be tailored to the needs of IPM.

Credit facility to cotton farmers: Throughout the country, cotton farmers invariably depend upon the pesticide / fertilizer dealer-cum-moneylenders for purchase of critical inputs. This nexus leads to purchase of undesirable and ineffective chemicals, leading to ineffective pest control and crop failures. Hence, cotton farmers' cooperatives can be formed and strengthened through Government institutions appropriately, so that the farmers are weaned away from moneylenders.

Marketing: Currently, the cotton is purchased at market yards; the different varieties of cotton with varying fibre qualities are dumped together and handled with atleast care. This practice should be avoided and necessary regulation is needed to effect the purchase of cotton staple-wise for processing separately and maintaining the quality standards. The present storage structures for cotton are totally inadequate and cotton is heaped in the open leasing to spoilage and deterioration in quality. Hence, adequate storage facilities shall be made a mandatory for those who stock, gin and process cotton for sale.

The **future of Cotton Research & Development** appears very bright with development of **male sterile based hybrids, hybrids with better fibre quality, cost effective production technologies and cotton with tolerance to pests and diseases.** The **transgenic cotton** may play a leading role in the coming decade and there is bright scope for India to emerge as the leading cotton producer of the world by the year 2010.

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