

### 3.1 : Brief History

#### Nagpur

Indian Central Cotton Committee used to sponsor cotton research schemes on an adhoc basis till the work of the committee was taken over by the ICAR in 1966. All India Coordinated Cotton Improvement Project (AICCIP) initiated by the Council in the year 1967 with headquarters at Coimbatore gave new fillip and direction in terms of multidisciplinary and multi-centre approaches with the active involvement of State Agricultural Universities. The project has contributed significantly in tackling location-specific problems in terms of varietal improvement and development of appropriate production and protection technologies. However, looking to the low level of productivity since major cotton growing area is

under rainfed conditions, a need for expanding the research efforts in the spheres of basic and fundamental research was felt, the Central Institute for Cotton Research was established at Nagpur by the ICAR, in 1976. The two regional stations of IARI at Sirsa (Haryana) and Coimbatore (Tamil Nadu) were transferred to CICR to cater to the needs of cotton farming in north and south India, respectively.

The main mission of CICR is to increase the production, productivity and profitability of cotton cultivation in different agro-ecological cotton growing zones through the development of relevant, feasible, economically viable and ecologically sound production and protection technologies including the development of improved varieties and hybrids and promoting basic and strategic research.

### 3.2 : Mandate

- **To conduct basic and strategic research on cotton to improve yield, fibre quality and by-products**
- **To create new genetic variability for location-specific adoption in cotton-based cropping systems**
- **To assist in the transfer of modern cotton production technology to various user agencies**
- **To extend consultancy and link with international agencies to accomplish the above mandate**

### 3.3 : Major Research Achievements

The institute has developed several genetically modified genotypes of *Gossypium hirsutum* and *Gossypium arboreum* (*desi*) varieties incorporating *cry1Ac*, *cry1F*, *cry1Aa3* genes for insect resistance, chitinase genes and viral coat protein genes for disease resistance and *dreB* and *Zn-finger* genes for drought resistance. These varieties are being subjected to biosafety testing and are expected to be made available to farmers within the next 4-5 years, after approval of the GEAC. The institute is known all over the world for its pioneering work on molecular pathology especially on the geographical diversity of bacterial blight pathogens and also for the complete range of DNA based detection kits of all cotton pathogens. The institute has pioneered the development of immunological ELISA (Enzyme linked immunosorbent assay) detection kits and DNA based PCR tests to detect genetically modified (GM) crops that express any of the Bt genes such as *cry1Ac*, *cry2Ab*, *cry1F*, *cry1C* and also with generic markers for NPT-II and UID-A.

In a new exciting development, two new genetically modified events have been developed by the institute for resistance to the cotton leaf curl virus resistance. A novel class I *chitinase* gene confirming fungal disease resistance was amplified, cloned from *G. hirsutum* (LRA 5166) and transformed into grey mildew susceptible *G. arboreum* cultivars PA 255, PA 402 and RG 8. The events were found to be promising and are being intensively tested for resistance. Lectin genes CFA from *Colocasia esculenta* and AMTC from *Amorphophallus poeniphalus* were effective against aphids and whitefly and in combination with banana lectin form a potent source of gene

for the developmental of sucking pest resistant GM cotton.

From the conventional varietal improvement programme, two high yielding *G. arboreum* varieties viz., CISA 310 and CISA 614 were released and notified for cultivation in the North zone. In addition, an early maturing, high oil yielding compact *G. hirsutum* variety CNHO 12 was released and notified for the Central zone.

The institute has the world's second largest germplasm collection and 26 wild species which are being used in 'introgression breeding' to develop varieties resistant to insect pests, diseases and abiotic stress. Several other innovative aspects of useful research include the discovery of apomixis, cleistogamy, temperature sensitive male sterility and five-loculed genotypes.

The institute has obtained several national and international patents in South Africa, China and Uzbekistan. The Bt-detection kits have been patented and commercialized. The kits have become extremely popular with farmers, extension workers and seed testing agencies, as evidenced by the fact that kits worth more than Rs. 422 lakhs have been purchased thus far. The Bt-detection kits enabled regulation, streamlining and ensuring Bt-cotton seed quality for farmers in the country. All seed testing laboratories in the country have been using the kits. The bollworm resistance management strategies using the resistance detection kits were implemented in 26-32 cotton growing districts in the country over 10 years with financial support from the ICAR and the Ministry of Agriculture, Government of India. The research and technology innovation thus resulted in reducing the usage of insecticides by more than 60-80% without any reduction in yields. The project which

has been funded by the Ministry of Agriculture has about 100,000 farmers as direct beneficiaries and was implemented in 1650 villages covering nearly 200,000 hectares in 30 districts of 10 cotton growing states since 2002. The direct benefits from the project implementation are estimated to be more than Rs. 160 crores on account of insecticide reduction and enhanced yields. Last year, the IRM strategies were disseminated in 330 villages of 11 districts in North zone, 172 villages in 11 districts of Central zone 150 villages of 10 districts in South zone and 10 villages of South 24 Pargana, district of East zone reaching out to 38,472 cotton farmers.

Artificial diets for aphids, jassids and white flies were developed. For eco-friendly (organic) pest management, Mealy Kill was found effective against mealy bugs and synthetic analogues of methyl jasmonate, ocimene and limonene were effective against jassids, aphids and mealy bugs. A talc based formulation of entomopathogen *Lecanicillium leccani* was developed which was effective against mealy bugs (*Phenacoccus solenopsis* and *Paracoccus marginatus*). Insecticide resistance in jassids was quantified in a networking mode for the first time. Jassids were found to exhibit 5450 fold and 2500 fold resistance to imidacloprid and thiamethaxam as compared to 57 fold resistance to conventional chemicals such as monocrotophos.

Agronomy of NHH 44 Bt on rainfed Vertisols of Central zone was standardized and 90 x 30 cm spacing was found optimum. Supplementing the recommended NPK with Zn (10 kg/ha) and

B (3 kg/ha) was found necessary to sustain rainfed cotton yield on shallow (less than 50 cm) black soils. A prototype of a 2-row fertilizer applicator as an attachment to the bullock drawn blade harrow was developed. Agrotechniques to boost the productivity of ELS cotton – fertigation (90:19:37 kg N:P:K) in 6 splits, alternate day drip irrigation at 0.8 Etc, soil moisture conservation through bio-degradable mulches were standardized.

The institute has developed many implements and devices and has filed patent applications for 'solar powered knap sack sprayer' and 'bullock drawn planter' that have been developed and commercialized. The CICR has also developed and validated a cotton crop simulation model for yield gap analysis and regional production forecast. The socio-economists of the institute have carried out detailed studies on the agrarian crisis in Vidharbha and other cotton growing regions of the country and have suggested programmes research approaches that can offer solutions to the crisis. CICR has initiated special research programmes under the 'Technology Mission' project to face the emerging challenges and pave the way towards yield enhancement.

The Institute contributed immensely towards yield enhancement through its research findings that helped in developing remedial measures for the management of mealybugs, leaf reddening, and wilt problems which have recently become a menace, especially reducing yields of Bt-cotton.

### 3.4 : Staff Position (as on 31<sup>st</sup> March, 2011)

Name of the Post	Sanctioned Cadre Strength				Post Filled Up			
	NGP	CBE	Sirsa	Total	NGP	CBE	Sirsa	Total
Director (RMP)	1	-	-	1	1	-	-	1
P.C. (Cotton) & Head	-	1	-	1	-	1	-	1
Scientific	50	22	7	79	32	17	6	55
Technical	50	20	7	77	46	12	6	64
Administrative	34	9	5	48	27	6	5	38
Supporting	59	30	10	99	45	18	10	73
<b>Krishi Vigyan Kendra</b>								
Training Organizer	1	-	-	1	1	-	-	1
Technical	11	-	-	11	8	-	-	8
Administrative	2	-	-	2	2	-	-	2
Supporting	2	-	-	2	1	-	-	1

NGP – Nagpur; CBE - Coimbatore

### 3.5 : Financial Statement

The budget grant and actual expenditure for the year 2010-11 are furnished below:

(Rs. in Lakhs)

S. No.	Scheme	Sanctioned	Expenditure
1	Plan	300.00	299.95
2	Non-Plan	1806.47	1806.22
<b>PLAN SCHEME</b>			
3	National Seed Project (Crop)	5.60	1.31
4	Krishi Vigyan Kendra	117.75	115.03
5	AICRPS Remtt.	857.00	857.00
6	PC Cell (AICCIP)	43.00	42.99
7	TMC MM-I	430.30	430.30
8	TMC MM-I CICR	219.70	219.69
9	MSP	25.05	23.15
10	ITMU Project	70.50	6.40
	<b>Total Plan Scheme</b>	<b>1768.90</b>	<b>1695.88</b>
<b>NAIP PLAN SCHEME</b>			
11	NAIP Value chian	28.79	27.96
12	NAIP DSS	16.08	13.36
13	NAIP Geosis	4.75	4.29
14	NAIP L & CB	4.60	4.59
15	NAIP ASRB	14.60	11.23
	<b>Total NAIP</b>	<b>68.82</b>	<b>61.43</b>
<b>DEPOSIT SCHEMES FUNDED BY OUTSIDE AGENCIES</b>			
16	Transgenic Crop	35.21	16.87
17	Bt.Cellous	0.04	0.00
18	MMFRQDBT	0.57	0.00
19	Fast Track	2.78	2.23
20	RNAi DBT	5.20	3.78
21	Gene Stacking	6.40	5.83
22	DUS Scheme, Ngp	5.00	3.58
23	DUS Scheme, Cbe	7.50	4.18
24	Dupont Scheme	3.34	0.00
25	J.K. Toxin	6.74	0.12
26	NMITLI	31.67	20.66
27	DBT Marker	6.05	3.82
28	Indo AUS DBT	12.54	5.70
29	Genetic Eng.(AKI)	5.76	5.58
30	Maint. Of Breeder Seed Scheme.	0.03	0.00
31	TMC Scheme MM-II	77.01	73.55
32	Mahyco I	9.18	2.32
33	Mahyco Bollgard II	13.87	3.81
34	FLD Scheme	0.45	0.42
35	Training	6.67	3.88
36	Testing fee	150.29	81.48
37	FLD KVK	1.11	1.09
38	Bt. Kit	112.14	0.03
39	DUS Mahyco RKD	2.65	1.02
40	SPM	3.24	3.24
41	CROPSAP	2.60	2.43
42	EBAM Project	30.50	10.74
43	EPN (BT Cloning)	21.38	21.21
44	DUS Testing (VS)	1.78	0.23
45	DUS Testing CBE	2.38	0.35
46	I & ISS Project	6.35	5.87
47	DNA Bar Code	10.00	4.03
48	GEAC Project	18.51	18.48
49	Cotton Picking	29.89	7.55
50	DBT Insect RNAi	23.59	9.09
51	BRL-II	10.00	7.19
52	GA ARIS	9.68	5.15
	<b>Total</b>	<b>672.08</b>	<b>335.52</b>

