

FRONT LINE DEMONSTRATION IN COTTON

ANNUAL REPORT (2002-03)
All India Coordinated Cotton Improvement Project
Coimbatore-641 003

Published by:

Project Coordinator (Cotton) & Head
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FOREWORD

Front Line Demonstrations (FLDs) were conducted during 2002-03 season in sixteen centres to transfer the significant technologies, developed by the centers of the All India Coordinated Cotton Improvement Project as well as the Central Institute for Cotton Research.

The practical utility in efficient cotton production by the farmers of the ten cotton growing states was provided to farmers. The significance of these 480 FLDs at an outlay of & 25 lakhs is to enable cotton growers of the country to produce cotton fibre of desired quality, as cherished by the textile industry of the country. Satiation of their demand to achieve self sufficiency of all the fixed types of yarn quality is paramount to sustain our foreign exchange earnings through export of value added products to world markets.

Location specific efficient techniques to reduce cost of cultivation and sustained production of seed cotton through adoption of newer high yielding varieties and hybrids and suitable management of nutrients, weeds, pests and diseases were included as themes of the FLDs conducted during 2002-03. The programme also organized Krishi Melas at various centers to ventilate these success stories to larger sections of cotton growers of each state.

This Annual Report presents the activities of various techniques to improve fibre production. These activities have undoubtedly left indelible impressions in the cotton growers to practice these with zeal.

Project Coordinator (Cotton Improvement)
CICR Regional Station, Coimbatore - 641 003

ACKNOWLEDGEMENTS

It is gratifying to note that the sixteen centres of AICCIP could successfully conduct 480 Front Line Demonstrations during 2002-03. I place on record appreciation on behalf of the funding agency as well as ICAR to the scientists of these centres for whole-hearted cooperation to achieve the desired objectives. Most deserving are those 486 farmers, who partnered this programme to successfully demonstrate various new techniques to produce good quality cotton in a sustainable and cost-effective manner to the rest of their community of three cotton - growing zones.

I acknowledge Dr. C.R. Hazra, Agricultural Commissioner, Government of India for his thoughtful planning and involvement of this programme. Thanks are also due to Additional Commissioner of Agriculture (Cotton), Deputy Commissioner of Agriculture (Cotton) as well as Director, Directorate of Cotton Development, Mumbai for their support. The Assistant Director General (Commercial Crops), ICAR and Director of Central Institute for Cotton Research, Nagpur offered their help to manage this programme successfully. The Departments of Agriculture of the various states in which this programme conducted co-operated well to make it successful. Their officials involved deeply in the programme and liaison with farmers and scientists.

It is significant to acknowledge the appreciation and gratitude to various scientists of CICR Regional Station, Coimbatore, viz., Mr A. Kannan, Dr. P. Chidambaram, Dr. N. Gopalakrishnan, Mr. M. Sabesh and many others. The successful management of this programme was possible also due to the services of Mr.V. Rathnasabapathy and Mrs. Lakshmi Krishnamurthy and all others of PC's Office.

Project Coordinator (Cotton Improvement)
CICR Regional Station, Coimbatore - 641 003

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FRONT LINE DEMONSTRATION IN COTTON 2002 – 2003

INTRODUCTION

The Indian Council of Agricultural Research has started **Front Line Demonstration** during *Kharif* 1995 in All India Coordinated Cotton Improvement Project centres. Several demonstrations are being conducted for popularizing the improved released and pre released varieties and hybrids with improved agronomic and crop protection techniques. This project also involves in organizing extension programmes for disseminating the recent agricultural technology and crop management practices to bridge up the gap between the clientele and the research institutes and thereby boosting up cotton productivity and economic conditions of the farmers.

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 feed back from cotton farmers and suitably reorient their research programmes and develop appropriate technology packages.
- To create effective linkage among Scientists, Extension Personnel and Farmers.

NODAL AGENCY

The **All India Coordinated Cotton Improvement Project (AICCIP)** acts as the Nodal Agency for conducting the cotton **Front Line Demonstration** programme in the country. **The Project Coordinator (Cotton)** coordinates and monitors the implementation of the **FLD** Programme with Headquarters at the **Central Institute for Cotton Research, Regional Station, Coimbatore**. The FLDs are organized through fifteen centres of the AICCIP network spread over ten cotton-growing states. Besides, C.I.C.R, Nagpur also participated actively in the programme.

FINANCIAL OUTLAY

The Ministry of Agriculture and Cooperation, Government of India have sanctioned **Rs.25 lakhs** for Organizing **500 Front Line Demonstrations** in all the cotton growing states of the country during the cropping season of **2002-2003**.

The **FLDs** offer a good opportunity for closer interaction between Scientists of different disciplines and the extension officials of cotton growing states. The coordinating centres organize **Krishi Me/as** during the cropping season for highlighting the major achievements, packages of practices and newer technologies ready for transfer to farmers' fields. This has facilitated better feedback from the farmers to the scientists.

DETAILS OF DEMONSTRATION

Each demonstration is held in an area of 1 ha. The farmers involved in this programme are provided with a subsidy of Rs. 2,500/- per demonstration towards purchase of inputs required for effective implementation of the technologies. Such selected farmers serve as 'Lead Farmers' and guide other farmers in the neighbouring areas for quicker adoption of the improved technologies.

The participating centres have the mandate to conduct one or two *Krishi Melas* at selected demonstration fields to enable the farming community to have first hand experience of the new technology working under field conditions. An amount of Rs. 1,000/- per demonstration has been allotted for arranging *Krishi Melas*. An amount of Rs. 1,500/- per demonstration has been provided for POL charges and TA for effective monitoring of demonstrations in the organizing centres.

The details of Centre-wise breakup of Front Line Demonstrations and budget provisions are furnished in Table 1.

Table 1: Break up of Budget allocation for different Centers and PCs cell

CENTRE	No. of demonstrations	Area (ha)	Grant for Input @ Rs.2500 per demo.	Funds for POL and TA @Rs. 1,500 per demon.*	Funds for <i>Krishi Mela</i> @Rs. 1,000 per demon.**	TOTAL Rs.5,000 per demon. (Rs.)
NORTH ZONE						
PAU, Faridkot	30	30	75,000	45,000	30,000	1,50,000
CCSHAU, Hisar	30	30	75,000	45,000	30,000	1,50,000
RAU, Sriganaganagar	20	20	50,000	30,000	20,000	1,00,000
MPUAT, Banswara	10	10	25,000	15,000	10,000	50,000
CSAUAT, Mathura	5	5	12,500	7,500	5,000	25,000
CICR, Sirsa	20	20	50,000	30,000	20,000	1,00,000
Total	115	115	2,87,500	1,72,500	1,15,000	5,75,000
CENTRAL ZONE						
GAU, Surat	50	50	1,25,000	75,000	50,000	2,50,000
JNKVV, Khandwa	30	30	75,000	45,000	30,000	1,50,000
Dr. PDKV, Akola	30	30	75,000	45,000	30,000	1,50,000
MAU, Nanded	30	30	75,000	45,000	30,000	1,50,000
MPKV, Rahuri	30	30	75,000	45,000	30,000	1,50,000
OUAT, Bhavanipatnam	15	15	37,500	22,500	15,000	75,000
CICR, Nagpur	30	30	75,000	45,000	30,000	1,50,000
Total	215	215	5,37,500	3,22,500	2,15,000	10,75,000
SOUTH ZONE						
ANGRAU, Guntur	50	50	1,25,000	75,000	50,000	2,50,000
UAS,Dharwad	50	50	1,25,000	75,000	50,000	2,50,000
TNAU, Coimbatore	50	50	1,25,000	75,000	50,000	2,50,000
Total	150	150	3,75,000	2,25,000	1,50,000	7,50,000
Sub-Total	480	480	12,00,000	7,20,000	4,80,000	24,00,000
PC Cell				50,000	50,000	1,00,000
Grand Total	480	480	12,00,000	7,70,000	5,30,000	25,00,000

* Includes POL, TA, Maintenance of vehicle and if required for vehicle rental for the purpose.

** Includes *Krishi Meta* and supply of printed matter, reports etc.,

The centre wise details of the technologies taken up for demonstrations are given in Table 2.

Table 2: Technologies demonstrated under FLD during 2002-2003

Centre	No. of FLD trials conducted	Achievements
PAD, Faridkot	30	NORTH ZONE
		1. Demonstration for popularization of American cotton varieties - F.1861 and LH.15 56 and Desi cotton varieties - LD.327 and LD.694
CCSHAU, Hisar	30	1. Varieties/hybrid trials on farmers' fields (<i>arboreum</i> & <i>hirsutum</i> cotton) like AAH.I, HD.123, HS.6, H.1098, H.1117, LHH.144 2. Yield maximization 3. Integrated Plant Nutrient Management (IPNM) 4. Disease Management
CICR, Sirsa	20	1. Demonstration of resistant/tolerant hybrid-Omshankar and LHH.144 2. Integrated Pest Management Technology 3. Insecticides Resistance Management 4. Hybrid Seed Production Technique
RAU, Sriganaganagar	66	1. Varietal demonstration of RS.81 0, RS.875, RS.2013 and RG.8
MPUAT, Banswara	10	1. Hybrid demonstration on H.10 2. Demonstration on insecticide spray schedule on H.8 3. Intercropping of cotton-maize (H.8)
GAU, Surat	50	CENTRAL ZONE
		1. Varietal demonstrations on G.Cot.MDH.II, G.Cot.23, G.Cot.Hy.1 02, G.Cot18 and G.Cot 21 2. Improved agronomical practice 3. IPM
JNKVV, Khandwa	30	1. Varietal demonstrations on improved <i>arboreum</i> variety G. <i>arboreum</i> under rainfed conditions 2. Integrated Nutrient Management
Dr. PDKV, Akola	30	1. Demonstrations on newly released varieties and hybrids - PKV HyA, PKV Hy.5 and AKA.7 with improved package of practices Vs Farmers practice 2. Timely application of fertilizers V s 15 days delayed application 3. Seed treatment with Azotobacter & PSB Vs No seed treatment 4. Opening of ridges and furrows Vs farmers practice 5. Spraying of nutrients (2% urea at flowering and 2% DAP at BDS) Vs No spraying

MAD, Nanded	30	<ol style="list-style-type: none"> 1. Demonstration on advantage of dry sowing on yield potential of hybrid <i>NHHA4</i> over Normal sowing 2. Demonstration of effectiveness of recommended spacing (60cmx60cm) over wider spacing (90cmx90cm) for rainfed hybrid cotton (<i>NHHA4</i>) 3. Demonstration of utility of basal dose of fertilizer at the time of sowing Vs delayed application of basal dose of fertilizer (<i>NHHA4</i>) 4. Demonstration on new cotton genotypes - NH.545, desi cotton variety PA.255 vis-a-vis American cotton hybrid <i>NHH.44</i> 5. Demonstration on impact of spraying of micro nutrients on cotton crop (Hy.NHH.44) in relation to seed cotton yield and quality (spraying of MgSO₄) @ 0.2% at 45 and 75 days after sowing)
MPKV, Rahuri	30	<ol style="list-style-type: none"> 1. Demonstrations on yield maximization of hybrid <i>NHH.44</i> 2. Demonstration on minimum tillage 3. Intercropping of Ridge gourd in summer irrigated cotton 4. Integrated Pest Management in cotton 5. Demonstration on Integrated Weed Management in cotton 6. Integrated Nutrient Management 7. Integrated Nutrient Management in rainfed cotton 8. Varietal performance of JLA.794 and Y.I
OUAT, Bhawanipatna	15	<ol style="list-style-type: none"> 1. Demonstration on location specific, holistic eco- friendly IPM module for eco-friendly and sustainable cotton production
CICR, Nagpur	50	<ol style="list-style-type: none"> 1. Popularization of variety LRK.516 2. Use of bio-pesticides which includes extracts of neem plant leaves and NSK 3. Proper plant population maintenance 4. Rotation crop to get stable yield 5. Careful selection of inter row crops 6. Covering of spot with soil during spot application of fertilizers 7. Need based application of nutrients and other chemicals 8. Use of bio control agents to save the red gram crop 9. Application of organics like vermicompost, cow urine and new product <i>kamadhenu</i>
ANGRAU, Guntur	40	SOUTH ZONE
		<ol style="list-style-type: none"> 1. Use of straight fertilizers 2. Use of micronutrients (Magnesium and Boron) 3. Adoption of foliar nutrition (Urea/DAP) 4. Adoption of IPM component
UAS, Dharwad	50	<ol style="list-style-type: none"> 1. Popularisation of Hybrids DHH.543, DHH.290 and Desi cotton variety. 2. Growth regulator spray 3. Leaf reddening management 4. Inter cropping in cotton + Green gram (1 :3) 5. IPM
TNAU, Coimbatore	25	Popularization of varieties / hybrids Viz., MCU.12, TCHB.213

The number of farmers who participated in the Front Line Demonstrations during 2002-2003 *Kharif* season is provided in Table 3.

Table 3: Number of FLD farmers in each zone

S.No.	Centre	No. of FLD farmers	No. of allotted FLD trials
NORTH ZONE			
I.	PAU, Faridkot	30	30
2.	CCSHAU, Hisar	30	30
3.	RAU, Sriganaganagar	66	20
4.	MPUAT, Banswara	10	10
5.	CSAUAT, Mathura	5	5
6.	CICR, Sirsa	20	20
CENTRAL ZONE			
7.	GAU, Surat	43	50
8.	JNKVV, Khandwa	30	30
9.	Dr. PDKV, Akola	30	30
10.	MAU, Nanded	30	30
II.	MPKV, Rahuri	30	30
12.	OUAT, Bhawanipatna	39	15
13.	CICR, Nagpur	30	30
SOUTH ZONE			
14.	ANGRAU, Guntur	40	50
15.	UAS, Dharwad	43	50
16.	TNAU, Coimbatore	15	50
	Total	491	480

HIGHLIGHTS OF FRONT LINE DEMONSTRATIONS

Results of Front Line Demonstration Trials

The results of the individual trials are reported in Annexure I and the impact of cotton Front Line Demonstrations in terms of percentage increase in yield has been furnished in Annexure II. The salient features of the responses obtained in each centre are discussed below.

NORTH ZONE

PAD, Faridkot

Season and Crop Production

The weather was largely dry and hot during the early crop season. The high temperature during the early growth period resulted into burning and hence mortality of the seedlings in many trials particularly in Bt. cotton (breeding) trial. Maximum population of spotted bollworm (2.1 larvae/plant) was observed in the first week of October whereas the population of American bollworm remained below the threshold level throughout the crop season. Cotton Leaf Curl Virus Disease (CLCuVD), bacterial blight, Myrothecium leaf spot (MLS) and Alternaria leaf spot (ALS) were the major diseases found.

During the year 2002-2003 the PAU, Ludhiana conducted 30 demonstrations on popularization of improved varieties / hybrids F.1861, LH.1556, LD.327 and LD.694. The average seed cotton yield of F.1861, LH.1556, LD.327 and LD.694 was 1,919 kg/ha, 1,900 kg/ha, 1,305 kg/ha and 17,58 kg/ha respectively.

Extension Activities

The centre has conducted seven *Kisan Me las*, four Training Lectures and two District Training camps during this year.

CCSHAD, Hisar

Season and Crop Production

The weather remained quite favourable for cotton crop in whole of the state. Maximum insect and pest damage observed throughout the crop season due to dry weather. The rainfall was received was 60 per cent less than the average. Dry weather prevailing at the time of flowering and fruiting stage resulted in good boll setting and effect on seed cotton yield. The incidence of *Helicoverpa* was very little.

A total of thirty demonstrations were conducted on improved varieties / hybrids (*arboreum* & *hirsutum* cotton), Yield maximization, IPNM, IPM and Disease Management.

Five varietal trials have been laid out on *Arboreum* cotton viz., AAH.1 and HD.123 against HD.107. Average yield of AAH.1 and HD.123 was 2462 kg/ha and 2010 kg/ha respectively as compared to variety HD.1 07 which obtained 1,640 kg/ha.

Four genotypes of *hirsutum* cotton i.e., HS.6, H.I098, H.1117 and LH.144 were tested against farmers' practices. Among all the varieties/hybrids, LH.144 hybrid gave highest seed cotton yield (3,050 kg/ha). Four demonstrations on yield maximization were laid and observed that variety H-1098 gave highest seed cotton yield (1,900 kg/ha).

Two demonstrations were carried out on Integrated Nutrient Management viz., use of organic and inorganic manure and balance fertilization. Highest seed cotton yield (2,480 kg/ha) was obtained where FYM was applied @ 10 t/ha.

One demonstration was laid out on two spacing (normal 67.5x30 cm and wider 100x30 cm) where normal spacing gave highest seed cotton yield 2,200 kg/ha as compared to wider spacing and farmer practices.

Three demonstrations on pest management were laid out on IPM practices. Highest seed cotton yield 2,300 kg/ha was obtained where deep ploughing and neem spray along with need-based pesticide spray was followed.

Two demonstrations on disease aspects were laid out with the application of seed treatment and root rot control. Highest seed cotton yield 2,150 kg/ha was obtained from AAH.1 hybrid where seed treatment with fungicide was carried out.

Five demonstrations on Disease Management were conducted. The seed treatment on fungicides and cultural practices were projected in demonstration. The highest seed cotton yield (1,650 kg/ha) was obtained in FLD plot where application of FYM along with deep ploughing was followed. It was 25 per cent higher than the yield obtained by farmer's practices.

Extension Activities

S.No.	Particulars	Place	Date	No. of farmers attended
1.	<i>Kapas Mela</i>	Hisar	16.10.2002	250
2.	<i>Kapas Field day</i>	Hisar	31.10.2002	140

CICR, Sirsa

Season and crop production

This zone is most potential cotton growing zone, having the productive soil and almost entirely irrigated. The cotton-wheat rotation system is prevalent in this zone. Earlier this zone used to contribute about 37% of the national production but now this zone is facing serious problems of continuous reduction in production for the last several years. The crop was severely damaged by the bollworms. The unfavourable weather with heavy rainfall during the reproductive phase of the crop, pest damage mainly caused by American and spotted/spiny bollworms and incidence of leaf curl virus diseases were the main causes for reduction in yield.

Twenty front line demonstrations were conducted during the year 2002-2003. Demonstrations on resistant/tolerant hybrid like Om Shankar and LHH.144 were conducted. Om Shankar is found to be high yielding (1,714 kg/ha) having uniform and early maturity with compact plant type and tolerant to pest and diseases whereas LHH-144 is also high yielding (1,613 kg/ha) and uniform hybrid with better quality and resistant to leaf curl disease.

Under IPM, the technologies viz., deep ploughing after harvest of the wheat, application of FYM or decomposed compost, avoiding high doses of nitrogenous fertilizers, resistant/tolerant hybrid/variety against insect-pest and diseases, use of pheromone or light 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 were demonstrated. The average sprays in IPM plot were 6 whereas it 7.5 in control plot. Average net profit was Rs. 2,790/- due to adoption of IPM technology.

Under IRM, resistant/tolerant hybrid/variety against sucking pest and CLCuV, avoiding use of broad spectrum organophosphates and acephate in the beginning, delaying first insecticide spray between 70 DAS, use of organophosphates between 90-110 days & Neem/NPV if possible and restricting the use of pyrethroids up to one or two spray after 110 days. The number of sprays given was only 4.5 in IRM plot and maximum yield obtained was up to 2,800 kg/ha.

Demonstration on hybrid seed production technique for LHH.144 and Desi hybrid AAH.1 parents was conducted. A farmers training programme on IPM was also organized at CICR, Regional station, Sirsa on 17.07.2002.

RAU, Sriganagar

Season and crop production

During vegetative phase of the cotton crop (June to August) high temperature prevailed and hence the sucking pests like jassids and white flies could not multiply at a faster rate. But the white fly increased in numerical order in early September and the incidence became very severe. This resulted in heavy losses in the seed cotton yield. Incidence of pink bollworm was in traces, however spotted boll worm took a yield. Incidence of pink bollworm was in traces, however spotted boll worm took a heavy toll through out the season both on upland and desi cotton.

Sixty-six FLDs were conducted during Kharif season of 2002 on different farmers' fields of Sriganagar and Hanumangarh districts. Varieties RS.810, RS.875, RS.2013 and RG.8 were planted in the demonstrations fields with improved package of practices against B. Nerma, F.846 with local package of practices. The improved package of practices on an average recorded 27.07% higher seed cotton yield over local package of practices.

Extension Activities

S.No.	Particulars	Place	Date
1.	Field day	Sadhuwali, Sriganagar	27.09.2002

MPUAT, Banswara

During the year 2002-03, 10 Front Line Demonstrations were conducted by this centre during *kharif* 2002. Out of 10 FLDs allotted to the centre two FLDs were conducted on varietal

performance on Hybrid H.10 over the check H.8. The mean seed cotton yield obtained from H.10 was 2,115 kg/ha. Six demonstrations on insecticide spray schedule on H.8 were conducted and the mean yield obtained was 1,576 kg/ha. The remaining two trainings were conducted on intercropping of cotton-maize (H.10) and the yield obtained was 1,787 kg/ha.

CENTRAL ZONE

GAU, Surat

The weather was quite favourable during the sowing season wherein the first shower of rainfall was received during first week of June, 2002. An average rainfall of 553 mm was received at the state level. In general the season was moderately to less favourable for cotton crop. During 2002-03, a total of 75 Front Line Demonstrations were conducted by Gujarat Agricultural University, Surat in four cotton-growing zone of Gujarat.

Centre-wise implementation of FLDs in Gujarat during 2002-03

Centre	No. of FLD allotted					
	Variety	Varietal	Agronomical	IPM	Total	Successful
Gramya Shilpi, Bhuj	G.Cot. 21	10	-	-	10	08
GAU, Surat	G.Cot.MDH.11 G.Cot. 23 G.Cot. Hy.102	1	-	-	1	1
GAU, Bharuch	G.Cot.MDH.11	111	-	-	111	-11
GAU, Devgadbaria	G.Cot.23	1	-	-	1	1
GAU, Talod	G.Cot Hy.102	2	-	-	2	2
GAU, Khedbrahma	G.Cot Hy.102 G.Cot.MDH.11	11	-	-	11	11
GAU, Viramgam	G.Cot.21	25	-	-	25	19
GAU, Arnej	G.Cot.21 G.Cot.MDH.11	31	-	-	31	21
GAU, Dhanduka	G.Cot.21 G.Cot.MDH.11	21	-	-	21	2-
GAU, Bhachau	G.Cot.21	5	-	-	5	-
GAU, Junagadh	G.Cot.18	-	1	1	2	1
GAU, Amreli	G.Cot.MDH.11	2	-	-	2	2
Total		48	1	1	50	35

Details of *Krishi Melas* / Field days / Farmers Shibirs conducted during 2002-03

S.No.	Place	Date	No. of farmers attended
1	Village: Bodeli, Dist.Vadodara	13.06.02	400 (Approx)
2.	Village: Valia Ta.Valia, Dist. Bharuch	11.08.02	500 (Approx)
3	Village: Bar, Ta.Ghoghamba, Dist.Panchmahal	14.08.02	38
4	Village: Mota Fofalia, Ta.Kakjan,	29.09.02	200 (Approx)
5	Village Chuda, Dist. Surendranagar	01.10.02	300 (Approx)
6	Village: Haldar, Dist. Bharuch	07.10.02	150 (Approx)
7	Village: Kajavas, Ta. Khedbrahma, Dist. Saabarkantha	28.10.02	340 (Approx)
8	Village: GAU, Dhandhuka, Dist. Ahmedabad	28.10.02	408
9	Village: Vagra, Dist. Bharuch	20.11.02	About 700
10	Village: Bor, Ta. Ghoghamba, Dist. Panchmahal	24.12.02	37
11	Village: Poyda, Ta.Patdi, Dist. Surendranagar	07.01.03	55
12	Village: Savda, Ta.Patdi, Dist. Surendranagar	09.01.03	35
13	Village: Simartha, Ta.Amod, Dist. Bharuch	09.01.03	200 (Approx)
14	Village: Parikha, Ta.Dabhoi, Dist. Vadodara	18.01.03	150 (Approx)

JNKVV, Khandwa

Madhya Pradesh is an important cotton growing state of the country. It covers an area of about 6.0 lakh hectares under cotton and contributes more than 15 lakh bales in total production of cotton. Within the state, Nimar valley covers an area of 4.5 lakh hectares under cotton. The variety / hybrids grown are highly influenced by the large number of hybrids released in Gujarat, Maharashtra and those by the private seed producing agencies. Cultivators need improved *desi* varieties with high yield potential.

Thirty front line demonstrations on cotton are being carried out during crop season 2002-03 with objectives viz.

1. To adjudge the performance of improved *G. arboreum* variety Jawahar Tapti under limited irrigation/rainfed conditions - 20
2. Integrated Nutrient Management - 10

Arboreum varieties Jawahar Tapti out perform by producing 28.5 % more seed cotton yield as compared to that of farmers' variety/hybrid. The difference between seed cotton yield of Jawahar Tapti (1,170 kg/ha) and farmer's variety (908 kg/ha) ranged from minimum of 9.80 % to the maximum of 43.90 %.

Farmers were advised to apply the major nutrients 100:50:25 NPK kg/ha as nitrogen in four splits and P and K in two. Fertilizer placement was done by column method. Farmers observed a vast increase in seed cotton yield ranging from 16.28 per cent to 40.42 per cent over farmer's practice

Extension Activities

S.No.	Particulars	Place	Date	No. of farmers attended
1.	<i>Kisan Divas</i>	Bhagawanpura village, Pandhana Block.	23.11.2002	200

Dr. PDKV, Akola

During 2002-03, 30 Front Line Demonstrations were conducted in area of cotton growing district of Vidarbha region under rainfed conditions.

A total of 10 demonstrations were conducted on newly released varieties and hybrids PKV.Hy.4, PKV.Hy.5 and AKA.7 with improved package of practices Vs farmers' practice. A newly released cotton hybrid PKV.Hy.4 recorded 9.25 per cent increased seed cotton yield over NHH.44 and 28.25 per cent over other research hybrids. PKV.Hy.5 yielded 11.11 per cent over farmers own choice hybrid Ajit-55 Anand. AKA.7 has produced 4.76 per cent more yield than AKA.5. All the 10 trials on an average gave 12.09 per cent higher yield than farmers' practice.

Three demonstrations were conducted on timely application of fertilizers Vs 15 days delayed application. The results showed that 15 days delay in fertilizer application resulted in reduction of 10.16 % seed yield as compared to timely application of recommended dose of fertilizer.

One demonstration was conducted on seed treatment with Azotobacter and PSB Vs no seed treatment. Seed inoculation with Azotobacter and PSB biofertilizer recorded 12.5 % increased seed cotton yield over control.

Six demonstrations were conducted on opening of ridges and furrows Vs farmers' practice. This technology has given 12.15 % more seed cotton yield than control. Ten demonstrations were conducted on spraying of nutrients (2 % urea at flowering and 2 % DAP at BDS) Vs No spraying. Foliar application of 2 % urea at flowering and 2 % DAP at BDS resulted in getting 14.03 % more seed cotton yield than control (no spraying). Foliar spraying of nutrients resulted in more seed cotton yield by 7.79, 25.0 and 9.27 % in PKV Hy.2, NHH.44 and PKV-Rajat respectively as compared to control (no spraying).

Extension Activities

S.No.	Particulars	Place	Date	No. of farmers attended
1.	<i>Krishi Melawa</i>	Jalgaon Jamod	8.06.2002	300
2.	<i>Krishi Melawa</i>	Kherda	4.10.2002	150

MAU, Nanded

During 2002-03, 30 FLDs were conducted throughout Marathwada region for boosting up cotton productivity and economic condition of rainfed farmers.

Five demonstrations were conducted on advantage of dry sowing on yield potential of hybrid NHH.44 over normal sowing. Results indicated that on an average dry sowing of cotton gave 22.23 per cent higher increased seed cotton yield over normal sowing of cotton crop.

Five demonstrations were conducted on effectiveness of recommended spacing (60cmx60cm) over wider spacing (90cmx90cm) for rainfed hybrid cotton (NHH.44). On average 33.7 % increased seed cotton yield was obtained due to adoption of optimum plant population over farmers' practices.

Five demonstrations were conducted on utility of basal dose of fertilizer at the time of sowing Vs delayed application of basal dose of fertilizer (NHH.44). The results of basal dose of fertilizer application at the time of sowing indicated an average yield increase of 34.56 % over the late application of basal dose of fertilizer.

Ten demonstrations were conducted on new cotton genotypes NH.545, desi cotton variety PA.255 vis-à-vis American cotton hybrid NHH.44. On an average of five FLDs *desi* variety PA.255 gave 947 kg/ha over American Hybrid, NHH.44 that gave only 659 kg/ha. On an average five FLD's, American variety NH.545 gave 936 kg/ha over American Hybrid, NHH.44.

Five demonstrations were conducted on impact of spraying of micro nutrients on cotton crop (Hy.NHH.44) in relation to seed cotton yield and quality (spraying of $MgSO_4$) @ 0.2% at 45 and 75 days after sowing). This technology resulted in 13.66 % increased seed cotton over control.

Extension Activities

S.No.	Particulars	Place	Date	No. of farmers attended
1.	<i>Krishi Melawa</i>	Dhanegaon Tq. Nanded.	12.06.2002	500

MPKV, Rahuri

Cultivation of irrigated cotton is confined to the districts of Pune, Solapur, Satara, Ahmednagar and some parts of Nasik, where cotton is sown in March - April and harvested up to August - September. In Jalgaon and Buldhana districts preseasonal irrigated cotton is grown which is sown in the first fortnight of May. In some parts of Solapur district cotton is grown also in Rabi season. Most of the cotton grown in the state is in rainfed area. Only one per cent (one lakh ha), cotton is grown in irrigated area having high yield potential compared to those that of rainfed cotton.

This centre has conducted 18 demonstrations in Ahmednagar, 2 demonstrations in Solapur and 10 demonstrations in Jalgaon district.

Three demonstrations on yield maximization of summer irrigated cotton hybrid were conducted. While comparing the demonstrations on yield performance with farmers practice, it was observed that farmers harvested 383 kg/ha more seed cotton yield as compared to farmers' practice.

Three demonstrations on minimum tillage in summer irrigated cotton hybrid were conducted. It was seen that the farmers got about 300 kg/ha less seed cotton yield as compared to the farmers' practices. In this demonstrations, there was saving in the cost on preparatory tillage i.e. Rs. 4,550/- and weeding cost i.e. 3,500/- (Two weeding). Total saving was Rs. 8,050/ per ha.

Three demonstrations on intercropping of ridge gourd in summer-irrigated cotton were conducted. In the above intercropping demonstrations ridge gourd was dibbled on one side of ridge at 90x 150 cm one month before the planting of cotton. The farmers have harvested about 1,650 kg of seed cotton and 7,533 kg of ridge gourd yield. Taking into considerations the prevailing market rates of seed cotton and ridge gourd, the farmer have got more than Rs. 70,000/- (Rs. Seventy thousand only) and cost of cultivation not exceeding Rs. 30,000 (Rs. Thirty thousand only) per hectare.

Two demonstrations on Integrated Pest Management (IPM) in swimmer-irrigated cotton were conducted. In this demonstration pheromone traps were used. Two spraying of heliokil and endosulfan alternately, growing of maize crop at border as trap crop for sucking pest etc., were applied. From the above demonstrations, the farmers harvested more seed cotton yield by adoption of Integrated Pest Management module and which was more by 5.9 per cent.

Three Demonstrations on Integrated Weed Management in summer-irrigated cotton were conducted. This project recommended Basalin 1.5 kg a.i./ha as preemergence spray to control the weeds in cotton crop. One pre-emergence spray of Basalin helps to suppress the growth of weeds

and reduce the cost of one weeding. From these demonstrations the farmers got about 84 kg/ha more seed cotton yield as compared to farmers' practice, which was more by 4.20 per cent.

Four demonstrations on Integrated Nutrient Management on summer-irrigated cotton were conducted. From these demonstrations the farmers got about 200 kg/ha more seed cotton yield as compared to the farmers' practices which was more by 10.25 per cent.

Two demonstrations on Integrated Nutrient Management on rainfed cotton were conducted. From these demonstrations the farmers got about 225 kg/ha more seed cotton yield as compared to the farmers' practices which was more by 22.5 per cent.

Ten demonstrations on varietal performance of varieties JLA.794 and Y.1 were conducted. All recommended agronomic and plant protection practices were followed to raise normal crop stand. JLA.794 yielded 1,187 kg/ha seed cotton that was 21.23 % more than that of Y.1.

OUAT, Bhawanipatna

During the year 2002-2003, fifteen Front Line Demonstrations were successfully conducted to study the profitability and production potential of IPM technologies in cotton over the prevailing farmers' practice in real farm situation. Thirty-nine beneficiaries were selected with the consultation of Department of Agriculture personnel from village Kendugubka of Bhawanipatna block of the Kalahandi district. The beneficiaries also cultivated cotton in their usual practice.

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Integrated Pest Management (IPM) technology component adopted were as follows:

1. **Clean up campaign:** Pre- sowing campaign was carried out during May through which farmers were advised for summer ploughing, use of certified seeds and maintaining fields free from stubbles.
2. **Selection of varieties:** Savita hybrid was sown by the beneficiaries.
3. **Seed treatment:** The farmers had used the imidachloprid treated seeds.
4. **Spacing:** The recommended spacing for hybrids i.e., 90 cm X 90 cm. was followed.
5. **Monitoring bollworm through pheromone traps:** Pheromone traps were installed at several spots in the village for monitoring the activity of bollworms. Thirty-nine pheromone traps were supplied to 39 beneficiaries. Seventy-eight lures each of *Heliothis armigera* and *Earias vittella* and thirty-nine of *Pectinophora gossypiella* were also given.
6. **Use of botanical pesticides:** Two foliar sprays of neem seed kernel extract (NSKE) @ 5 % or 25 kg / ha. per spray at 50 DAS and 100 DAS along with the detergent.

7. **Use of bio-pesticides :** Foliar spray with HaNPV @ 250 LE / ha. at 45 DAS during evening hours mixed with jaggery @ 5 gm/lt.
8. **Releases of natural enemies:** The egg parasitoid *Trichogramma chilonis* was released twice @ 105 lakh /ha. at 60 DAS and 70 DAS in IPM plots for control of bollworms. The parasitoid was released during evening hours. Spraying was avoided at least for seven days of release of the bio- fertilizer-agent.
9. **Mechanical control:** Topping was done at 80-90 DAS when the crop was 1.0 m. in height to destroy the eggs of *Heliothis* and hand collection and destruction of harmful larvae at weekly intervals starting from 45 DAS.
10. **Bird perches:** Bird perches were installed at several places in the IPM village.
11. **Use of chemical pesticides:** The farmers sprayed on their own two or three sprays of chemical pesticides such as Endosulfan, chloropyrifos and Profenophos.

The results of the present study reveals the percent increase in yield of seed cotton of IPM plots over non-IPM plots ranged from 6.7 to 25.0 percent. The additional returns obtained varied from Rs. 660.00 to Rs. 1,980.00 per acre. On an average the increase in seed cotton yield was 15.94 percent or 61.5 kg/ac. or 153.7 kg/ha. which resulted in an average additional return of Rs. 3,381.00 per ha.

Extension Activities: One farmers' *mela* was conducted.

CICR, Nagpur

During 2002-03, Central Institute for Cotton Research, Nagpur conducted a total of 30 demonstrations in the village Masala of Warora taluk. Masala village receives about 1100 mm rainfall mostly in the months of July and August. This year dry spell for one month in July-August and there was continuous rainfall in August due to which the farmers could not carry out any operation. Cloudy days were another problem. Thus the climatological condition was not favourable for cotton.

A total of 30 demonstrations were conducted on agro-techniques suitable for Anjali (LRK.516). The agro-techniques like row cropping and plant spacing (60cmx30cm or 60cmx20cm) was compared with farmers' method wherein they have purchased the variety LRK.516 from the farmers of the seed village. The use of bio-pesticides, which includes the extracts of neem plant leaves and NSK and other materials available with the farmers was suggested. Cotton to be grown as rotation crop was suggested. Most of the farmers were taking cotton after some leguminous crop. The suggestions were given to farmers to be more cautious and careful to get good crop yield from both intercrop and cotton. To minimize the nutrient losses by spot application, covering of spot with soil was suggested. Need based application of nutrients and other chemicals were recommended. Use of biocontrol agents to save the red gram crop through the release of bioagents was suggested. Application of organics like vermicompost, cow urine and new product *kamadhenu* was also suggested to the farmers.

A *Kisan Melawa* was organised along with *Rashtriya Kapas Melawa* at Nagpur on 8th December, 2002. All the beneficiary farmers attended the *Melawa*.

SOUTH ZONE

ANGRAU, Guntur

During the year 2002-03, fifty Front Line Demonstrations have been organised in two intensively cotton cultivated districts of Andhra Pradesh on popularizing of improved varieties / hybrids integrating with IPM technology and popularizing some of the implementable IPM technologies. Popularizing cotton production technologies consists the components like use of straight fertilizers, use of micro nutrients (Magnesium and Boron), adoption of foliar nutrition (Urea/DAP) and adoption of IPM components. The IPM technologies include growing of jassid resistant variety, seed treatment with Gaucho/Cruiser, stem application of insecticides, growing castor/marigold as trap crops, pheromone trap monitoring, use of NSKE/Neem Oil/Neem products and need based and correct use of insecticides. The crop was subjected to prolonged dry spell in August followed by severe drought situation in September and severely affected by thrips incidence.

The FLD farmers secured a gross income of Rs.35,420.00 per ha, while the net income was Rs. 18,920.00. In contrast to the FLD farmers, the check (Bunny) farmers could obtain a gross income of Rs. 40,250.00 and net income of Rs.16,655.00. Thus the FLD farmers netted a return of Rs.2.14 for each rupee invested on cultivation of bunny hybrid with production technology, while the check farmers realised Rs. 1.70 only. In Kurnool district, high yielding pest tolerant variety Narasimha was introduced for three demonstrations and Arboreum variety (Aravinda) for the remaining seven demonstrations. The FLD farmers secured a gross income of Rs.17,867/- per ha, while the net income was Rs.11,867/- per ha. In contrast to the FLD farmers, the Non FLD farmers could obtain a gross income of only Rs.13,000/- and net income of Rs.7,100/-. Thus FLD farmers obtained a net return of Rs.1.98 for each rupee invested on cost of cultivation of Aravinda, while the Non FLD farmers realised Rs.1.20 only.

Extension Activities

The following training programmes have been organised to FLD farmers to popularise FLD technologies.

S.No	Date	Village	Subject
1.	26.7.2002	Thimmapuram	Demonstration on the use of straight fertilizers.
2.	28.8.2002	Thimmapuram	Stem application techniques as IPM components were demonstrated.
3.	11.9.2002	Thimmapuram	Identification of sucking pest and the natural enemies in cotton.
4.	18.9.2002	Chinamakkene	Organised farmer's field school in identifying beneficial insects and scouting of Helicoverpa eggs and field incidence was recorded.
5.	5.10.2002	Ravela, Peesapadu, Rentapalla, Gundlapalem	Educated the FLD farmers on the use of micronutrients deficiencies and its remedies.
6.	9.10.2002	Thimmapuram	Demonstrated on identifying the natural enemies at the field level.
7.	26.10.2002	Chinnamakena	Conducted farm field school to educate the farmers on the monitoring Helicoverpa bollworm by using IPM components.
8.	14.12.2002	Jangamguntlapalem	Demonstrated on the use bio-pesticides in the control of Helicoverpa bollworm.

UAS, Dharwad

A total of fifty Front Line Demonstrations (FLDs) were conducted with newer hybrids/varieties viz., DHH.11, DHH.543, DHB.105, DHB.290, NHH.44 in different districts viz., Dharwad, Belgaum, Raichur, Bellary and Uttar Kannada, representing different agro-climatic regions coming under the jurisdiction of University of Agricultural Sciences, Dharwad. Technologies developed on new varieties/hybrids, Integrated Pest Management (IPM), Integrated Nutrient Management (INM), water management, leaf reddening management, boll rot management, Bt-cotton, growth regulator spray, intercropping and other crop management practices have been demonstrated In comparison with the conventional methods of crop production.

DHH.543 has recorded highest seed cotton yield of 2,101 kg/ha as compared to NHH.44 (1,815 kg/ha). Similarly 26.0 per cent yield increase was observed under DHB.105 hybrid cotton as compared to DCH.32. In DHH.11 hybrid cotton the IPM components were quite effective in checking the insect pest incidence, which resulted in more number of good open bolls and higher seed cotton (1,096 kg/ha) compared to non-IPM technology (1,700 kg/ha). IPM technology with NHH.44 also recorded higher yield (2,350 kg/ha) as compared to non-IPM technology (1,700 kg/ha). Similarly Bunny and DCH.32 cotton registered higher yield through IPM as compared to sole dependence on insecticides. In hybrid DHH.11 and DCH.32, application of MgSO₄ before the commencement of winter resulted in yield advantage to the tune of 13.0 per cent and 11.43 per cent respectively.

The application of DAP-2% spray on DHH.11 hybrid registered superiority in its yield (1,000 kg/ha) compared to check (825 kg/ha). In DHH.11 hybrid seed cotton yield to an extent of 15.95 per cent was achieved with foliar application of NAA @ 5 ml/18 lit. of water for two times during the reproductive phase of cropping season. Though the depth of irrigation was less (22.5 cm) in alternatively alternate furrow method as compared to irrigations of all furrows (33.0 cm), 32 per cent of irrigation water was saved by AAFI method without much reduction in *kapas* yield. Also performances of NHH.44 and DHH.11 hybrids were proved to be better in its yield under alternatively alternate furrow irrigation (2,000 and 2,000 kg/ha, respectively) as compared to all furrow irrigation (1,625 and 1,200 kg/ha respectively). The percent increases in yield under alternatively alternate furrow irrigation were 23 per cent (NHH.44 hybrid cotton) and 44.0 per cent in DHH.11 hybrid cotton.

In NHH.44 highest seed cotton yield of 1,375 kg/ha was registered with nipping practice as against the application of only RDF (150:75 :75) without nipping practice (1,200 kg/ha) to an extent of 15 per cent. DCH.32 hybrid cotton recorded higher yield in INM technology (1,810 kg/ha) as compared to check (1,460 kg/ha).

In DCH.32 hybrid, only two rounds of sprays of Mancozeb @2 gms and chloritoniil @2 gm/lit at boll formation and after first picking stage for boll rot resulted in 2.10 per cent yield advantage over check. Intercropping of DHH-11 + green gram (1:3) registered higher cost benefit ratio (1:2.33) compared to sole cotton (1:1.79). The performance of Bt-cotton MECH.162 registered higher seed cotton yield (2,500 kg/ha) as compared with DHH.11 hybrid cotton (1,400 kg/ha). The percent increase in yield was 44.0 percent over DHH.11 cotton hybrid.

Extension activities

Two field days were conducted with a view to popularize newly released cotton hybrid DHH.543 under FLD programme at Goppanakoppa village on 27.11.2002 of Hubli taluk and karadigudda village on 4.12.2002 of Dharwad taluk. A field day was conducted on 18th November, 2002 at Jigalur. Hundred farmers attended the field day. On 22nd November, 2002 a field day was arranged at Kurubagatti. One hundred and thirty farmers attended the field day.

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TNAU, Coimbatore

During the year 2002-2003, twenty-five Front Line Demonstrations have been laid out at Coimbatore division to demonstrate the production technologies and to popularize the newly released cotton variety MCU.12 and hybrid TCHB.213. In this region usually cotton sowing was taken up during August-September utilizing the Northeast monsoon rainfall. During this year rainfall received is 280 mm, which is low, compared to the previous year. Hence the farmers took late sowing due to late onset of rainfall and receiving low quantity of rainfall. In early stage, crop condition was good.

Later due to severe drought and less distribution of rainfall crop stand was poor. Hence some of the farmers adopted intercropping of tomato and radish as inter crop in cotton. Due to adoption of integrated Pest Management measures in the demonstration plots, the bollworm and other insect damage was controlled by one or two spraying as compared to four or five spraying in the farmers' fields. The adoption of improved technologies like adequate quantity of fertilizers, timely weeding, adoption of Integrated Pest Management measures etc., gave response in increasing the yield in demonstration plots over the farmers method of adoption.

The seed cotton yield recorded by MCU.12 ranged from 1,688 kg/ha to 2,125 kg/ha. The highest seed cotton yield of 2,125 kg/ha was recoded in the variety MCU.12. The yield increase in the demonstration plot was from 16.3 to 22.4 per cent over control (farmer's method).