

# **FRONT LINE DEMONSTRATION IN COTTON**

**ANNUAL REPORT (2004-05)**  
**All India Coordinated Cotton Improvement Project**  
**Coimbatore-641 003**

**Published by:**

**Project Coordinator (Cotton) & Head**  
**Central Institute for Cotton Research**  
**Regional Station, Coimbatore - 641 003**

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**Note :**

- The FLD Annual Report 2004-05 is the outcome of joint contribution by various participating centres of the Project and the Coordinator's unit at CICR, Regional Station, Coimbatore.
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## **FOREWORD**

Front Line Demonstrations during 2004 kharif season was successfully undertaken by six AICCIP centres each of North zone, Central zone and three in South zone. Altogether B55 demonstrations were undertaken in which 217 were in North zone, 495 in Central and 143 in South zone. The major technologies that were taken to the farm gates for demonstration were popularization of varieties / hybrids, Integrated crop production management practices with IPM technology under irrigated and rainfed conditions and implement demonstration.

The success story that could be projected was of the introduction of long linted arboreum cotton such as Jawahar Tapti from Khandwa ( Madhya Pradesh) and Parbhani Turab ( PA.255 ) from Parbhani ( Maharashtra ) to southern dryland districts of Tamil Nadu. Tamil Nadu Agricultural University ( TNAU ) took up demonstrations of Jawahar Tapti in Aruppukottai and Kovilpatti. They have also multiplied their seeds and kept ready for next year's FLD. It is gratifying to find that these two varieties have produced long staple, good quality cotton and the farmers got the same price as G.hirsutum varieties and hybrids. It could be sensational if drylands in South Indian States could take up these two and many more that have been released by All India Co-ordinated Cotton Improvement project ( AICCIP ) to emancipate the farm gate economics of such villages.

The budget outlay was to the tune of **Rs.45 lakhs** under FLD and **Rs.55 lakhs** under implement demonstrations with total outlay of **Rs. 100 lakhs**.

I acknowledge gratefully the financial support provided by Department of Agriculture and Co-operation. The programme was effectively implemented due to the diligent involvement of Scientists of All India Co-ordinated Cotton Improvement Project. The participatory farmers also need special appreciation for their quest for new knowledge which were test verified in their farms with their active involvement. Director, Central Institute for Cotton Research provided logistics and support along with directions to implement the visualized plans which were effectively undertaken.

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

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## **FRONT LINE DEMONSTRATION IN COTTON 2004-2005**

### **INTRODUCTION**

The All India Coordinated Cotton Improvement Project (AICCIP) acts as the Nodal Agency for conducting the cotton Front Line Demonstration (FLD) programmed in the country to undertake demonstrations of frontier technologies of cotton production through funding from Mini Mission-II (ICDP) of Technology Mission on Cotton. The Project Coordinator (Cotton Improvement) 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 network centres of the AICCIP network spread over ten cotton-growing states. Besides, Central Institute for Cotton Research, Nagpur and its regional station at Sirsa also participated actively in the Programme.

### **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.

### **FINANCIAL OUTLAY**

The Ministry of Agriculture and Cooperation, Government of India has sanctioned Rs. 100 lakhs for conducting Front Line Demonstrations and Implement Demonstrations for the year 2004-05.

### **LINKAGES WITH EXTENSION OFFICIALS**

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 Melas* 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/- worth of inputs per demonstration 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 Mela 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. 1000/- per demonstration has been allotted for arranging Krishi Mela. An amount of Rs. 1500/- per demonstration has been provided for PO.L. charges and TA for effective monitoring of demonstrations in the organizing centres.

### FRONT LINE DEMONSTRATIONS IN COTTON (2004-05)

During the year 2004-05, a total of 855 Front Line Demonstrations were allotted to AICCIP network centres all over the country. But 874 demonstrations were conducted. Break up of budget allocation for different centers and PC's cell are given in Table 1.

**Table 1. Break up of Budget allocation for different centers and PC's 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 Krishi mela @ Rs.720 per demon.** | Total Rs.5, 000 per demo. | Implement Demonstra Hon including Rs.2500 per demo |
|---------------------|-----------------------|------------|-------------------------------------|--|---|---------------------------|--|
| <b>North Zone</b>   |                       |            |                                     |  |   |                           |  |
| PAU, Faridkot       | 60                    | 60         | 1,50,000                            | 90,000                                       | 60,000                                      | 3,00,000                  | 3,00,000   |
| CCSHAU, Hisar       | 75                    | 75         | 1,87,500                            | 1,12,500                                     | 75,000                                      | 3,75,000                  | 3,00,000   |
| RAU, Sriganagar     | 20                    | 20         | 50,000                              | 30,000                                       | 20,000                                      | 1,00,000                  | 3,00,000   |
| MPUAT, Banswara     | 25                    | 25         | 62,500                              | 37,500                                       | 25,000                                      | 1,25,000                  | 3,00,000   |
| CICR, Sirsa         | 30                    | 30         | 75,000                              | 45,000                                       | 30,000                                      | 1,50,000                  | 4,00,000   |
| BCKYY, WB           |                       |            |                                     | Not cond                                     |   |                           | 3,00,000   |
| CSAUAT, Kanpur      | 7                     | 7          | 17,500                              | 10,500                                       | 7,000                                       | 35,000                    | 2,00,000   |
| <b>Sub Total</b>    | <b>217</b>            | <b>217</b> | <b>5,42,500</b>                     | <b>3,25,500</b>                              | <b>2,17,000</b>                             | <b>10,85,000</b>          | <b>21,00,000</b>                                   |
| <b>Central Zone</b> |                       |            |                                     |  |   |                           |  |
| GAU, Surat          | 50                    | 50         | 1,25,000                            | 75,000                                       | 50,000                                      | 2,50,000                  | 3,00,000   |
| JNKYY, Khandwa      | 125                   | 125        | 3,12,500                            | 1,87,500                                     | 1,25,000                                    | 6,25,000                  | 4,00,000   |
| PDKY, Akola         | 50                    | 50         | 1,25,000                            | 75,000                                       | 50,000                                      | 2,50,000                  | 3,00,000   |
| MAU, Nanded         | 70                    | 70         | 1,75,000                            | 1,05,000                                     | 70,000                                      | 3,50,000                  | 4,00,000   |
| MPKY, Rahuri        | 50                    | 50         | 1,25,000                            | 75,000                                       | 50,000                                      | 2,50,000                  | 3,00,000   |
| QUAT, Bhavanipatna  | 100                   | 100        | 2,50,000                            | 1,50,000                                     | 1,00,000                                    | 5,00,000                  | 3,00,000   |
| CICR, Nagpur        | 50                    | 50         | 1,25,000                            | 75,000                                       | 50,000                                      | 2,50,000                  | 3,00,000   |
| <b>Sub Total</b>    | <b>495</b>            | <b>495</b> | <b>12,37,500</b>                    | <b>7,42,500</b>                              | <b>4,95,000</b>                             | <b>24,75,000</b>          | <b>23,00,000</b>                                   |
| <b>South Zone</b>   |                       |            |                                     |  |   |                           |  |
| ANGRAU, Guntur      | 40                    | 40         | 1,00,000                            | 60,000                                       | 40,000                                      | 2,00,000                  | 400000   |
| UAS, Dharwad        | 40                    | 40         | 1,00,000                            | 60,000                                       | 40,000                                      | 2,00,000                  | 400000   |
| TNAU, Coimbatore    | 63                    | 63         | 1,57,500                            | 94,500                                       | 63,000                                      | 3,15,000                  | 300000   |
| <b>Sub Total</b>    | <b>143</b>            | <b>143</b> | <b>3,57,500</b>                     | <b>2,14,500</b>                              | <b>1,43,000</b>                             | <b>7,15,000</b>           | <b>11,00,000</b>                                   |
| <b>Total</b>        | <b>855</b>            | <b>855</b> | <b>21,37,500</b>                    | <b>12,82,500</b>                             | <b>8,55,000</b>                             | <b>42,75,000</b>          | <b>55,00,000</b>                                   |
| PC Cell             |                       |            |                                     |  |   | 2,25,000                  |  |
| <b>Grand Total</b>  | <b>855</b>            | <b>855</b> | <b>21,37,500</b>                    | <b>12,82,500</b>                             | <b>8,55,000</b>                             | <b>45,00,000</b>          | <b>55,00,000</b>                                   |

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

\*\* Includes Krishi mela and supply of printed matter, reports including PC's cell expd for annual reports, TA for for midterm review and misc

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

**Table 2: Technologies demonstrated under FLD during 2004-2005**

| Centre                             | No. Of FLD trials | Achievements  |
|------------------------------------|-------------------|---|
| <b>NORTH ZONE</b><br>PAU, Faridkot | 60                | <ul style="list-style-type: none"> <li>Improved varieties/Hybrids-F-1861, LH-1556, F-1378, LD-694, LD-327 and Moti</li> <li>Optimal sowing time</li> <li>Plant population</li> <li>Proper weed control</li> <li>Nutrient management</li> <li>Integrated pest management</li> </ul>          |
| HAU, Hisar                         | 75                | <ul style="list-style-type: none"> <li>Hybrid seed production of AAH-1</li> <li>Varieties/hybrid trials on farmer's fields (arboretum &amp; hirsutum cotton) on released and pre-released genotypes</li> <li>Yield maximization</li> <li>Integrated Pest Management (IPM)</li> </ul>        |
| RAU, Sriganganagar                 | 20                | <ul style="list-style-type: none"> <li>Improved variety RS 2013</li> <li>Improved variety RS 2013 with IPM</li> <li>Improved variety RS 2013 with INM</li> </ul>  |
| MPUAT, Banswara                    | 25                | <ul style="list-style-type: none"> <li>Integrated crop production management practices with IPM technology.</li> <li>Integrated crop production management practices with maize as an intercrop</li> </ul>  |
| CSUAT, Kanpur                      | 7                 | <ul style="list-style-type: none"> <li>Integrated crop production management practices as recommended by C.S Azad University of Agriculture to get the maximum yields</li> <li>Potential of the recommended cotton varieties Vikas and CAD-4.</li> </ul>                                    |
| CICR, Sirsa                        | 30                | <ul style="list-style-type: none"> <li>Demonstration on CSHH-198 hybrid</li> <li>Demonstration of CISAA2 (CICR 2)</li> <li>Integrated Pest Management</li> <li>Integrated Resistance Management</li> <li>Hybrid Seed production</li> </ul>  |
| <b>CENTRAL ZONE</b><br>GAU, Surat  | 51                | * Improved varieties/Hybrids G.Cot.Hy-10 (New), G.Cot.MDH-11, G.Cot.23, G.Cot.21, MECH-12, RCH-2(Bt)  |
| JNKVV, Khandwa                     | 115               | <p>* Performance of newly released G.arboreum (partially irrigated/rainfed conditions) KWA-23, Jawahar Tapto and JK-4</p> <ul style="list-style-type: none"> <li>Suitability of cotton hybrids for intercropping with maize (2:1) row ratio</li> <li>INM over farmers' practices</li> </ul> |

|                                     |     |   |
|-------------------------------------|-----|---|
| PDKV, Akola                         | 50  | <ul style="list-style-type: none"> <li>• Pre-released <i>G.arboreum</i> var. AKA-8 Vs, AKA-5 with their recommended package of practices</li> <li>• Pre-released <i>G. hirsutum</i> var. AKH-8828 Vs. PKV Rajat with their recommended package of practices</li> <li>• Soil management- Sowing of AKH-081 on shallow soil</li> <li>• In situ soil moisture conservation-opening of ridges &amp; furrows.</li> <li>• Dry sowing Vs. Monsoon sowing</li> <li>• Crop canopy management- 2% Urea at flowering and 2% DAP at boll development stage</li> <li>• Inter-cropping with short duration pulses</li> </ul>  |
| MAU, Nanded                         | 70  | <ul style="list-style-type: none"> <li>• Performance of American variety NH-545, PH-348 and desi variety PA-225 in comparison with American hybrid NHH-44.</li> <li>• Spraying of 2% DAP at 45 and 75 days after sowing in rainfed cotton.</li> <li>• Spraying of micro- nutrients i.e. MgSO<sub>4</sub> @ 0.2% at 45 and 75 days after sowing in relation to seed cotton yield</li> <li>• Integrated nutrient management for rainfed cotton hybrid NHH-44.</li> <li>• Inter cropping of black gram in rainfed cotton</li> <li>• Strip cropping of Red gram (6:2 ratio) in rainfed cotton hybrid NHH-44.</li> <li>• Rainwater conservation techniques in rainfed cotton</li> <li>• IPM in rainfed cotton.</li> <li>• Optimum plant population for rainfed cotton</li> </ul> |
| OUAT, Bhawanipatna                  | 129 | <ul style="list-style-type: none"> <li>• Integrated Pest Management</li> <li>• Integrated Nutrient Management</li> </ul>  |
| CICR, Nagpur                        | 50  | <ul style="list-style-type: none"> <li>• Integrated nutrient management in cotton</li> <li>• Cotton based inter – cropping (cotton + soybean)</li> <li>• Integrated pest management in cotton</li> <li>• Foliar application of DAP and detopping for yield improvement</li> <li>• Opening of ridges and furrows for moisture conservation.</li> <li>• Varietal trial of Surabhi (<i>G. hirsutum</i>)</li> <li>• Varietal trial of MB 120 (<i>G. hirsutum</i>)</li> </ul>  |
| <b>SOUTH ZONE</b><br>ANGRAU, Guntur | 40  | <ul style="list-style-type: none"> <li>• Intercropping blackgram in cotton</li> <li>• Straight varieties Vs Bt hybrids</li> <li>• Narasimha with IPM &amp; INM</li> <li>• Aravinda variety with improved technology</li> </ul>  |
| UAS, Dharwad                        | 33  | <ul style="list-style-type: none"> <li>• Popularisation of newer hybrids/varieties viz., DHH-543, DHB-290, RCH-2Bt, MECH-162 and DLSa-17</li> <li>• Integrated Pest Management</li> <li>• Irrigation management</li> <li>• Boll a rot management</li> </ul>   |



|                  |    |  |
|------------------|----|--|
| TNAU, Coimbatore | 72 | <ul style="list-style-type: none"> <li>• Introduction of <i>G.arboreum</i> variety Jawahar Tapti among the rainfed cotton</li> <li>• Popularization of MCU 12, MCU 13 and Bt cotton hybrid MECH 162 Bt</li> <li>• Popularization of improved agronomic practices for yield maximization – INM skipping basal in summer</li> <li>• Demonstration of the IPM technologies for effective pest and disease management</li> <li>• Chemical control of stem weevil</li> <li>• Popularization of the concept of Seed village to new areas</li> <li>• Chemical control of stem weevil</li> </ul> |
|------------------|----|--|

FLD farmers zone wise and under irrigated and rainfed conditions presented below in Table 3.

**Table 3: Number of FLD farmers in each zone**

| S. No.              | Centre              | No. of FLD farmers | No. of allotted FLD trials |
|---------------------|---------------------|--------------------|----------------------------|
| <b>NORTH ZONE</b>   |                     |                    |                            |
| 1.                  | PAU, Faridkot       | 60                 | 60                         |
| 2.                  | CCSHAU, Hisar       | 75                 | 75                         |
| 3.                  | RAU, Sriganaganagar | 20                 | 20                         |
| 4.                  | MPUAT, Banswara     | 25                 | 25                         |
| 5.                  | CICR Sirsa          | 30                 | 30                         |
| 6.                  | CSUAT, Kanpur       | 7                  | 7                          |
| <b>Total</b>        |                     | <b>217</b>         | <b>217</b>                 |
| <b>CENTRAL ZONE</b> |                     |                    |                            |
| 6.                  | GAU, Surat          | 51                 | 50                         |
| 7.                  | JNKVV, Khandwa      | 115                | 125                        |
| 8.                  | PDKV, Akola         | 50                 | 50                         |
| 9.                  | MAU, Nanded         | 70                 | 70                         |
| 10.                 | MPKV, Rahuri        | 40                 | 50                         |
| 10.                 | OUAT, Bhawanipatna  | 129                | 100                        |
| 11.                 | CICR, Nagpur        | 50                 | 50                         |
| <b>Total</b>        |                     | <b>505</b>         | <b>495</b>                 |
| <b>SOUTH ZONE</b>   |                     |                    |                            |
| 12.                 | ANGRAU, Guntur      | 40                 | 40                         |
| 13.                 | UAS, Dharwad        | 40                 | 40                         |
| 14.                 | TNAU, Coimbatore    | 72                 | 63                         |
| <b>Total</b>        |                     | <b>152</b>         | <b>143</b>                 |
| <b>Grand Total</b>  |                     | <b>874</b>         | <b>855</b>                 |

**Table 4 Zone wise Number of FLDs under irrigated and rainfed condition**

| Zones              | Irrigated          | Rainfed            | Total               |
|--------------------|--------------------|--------------------|---------------------|
| North              | 217                | -                  | 217                 |
| Central            | 16                 | 489                | 505                 |
| South              | -                  | 152                | 152                 |
| <b>Grand Total</b> | <b>233 (26.66)</b> | <b>641 (73.34)</b> | <b>874 (100.00)</b> |

Out of 874 FLDs conducted, 233 pertains to irrigated i.e around 26.66 per cent and 641 under rainfed conditions i.e., 73.34 per cent of the total.

The centre wise particulars on the total number of FLDs conducted, number off. FLDs failed and the number of successful FLD trials during the year 2004-05 are as detailed below in Table 5.

**Table: Details of Successful FLDs for the year 2004-05**

| S.No. | Centre              | No. of FLD trials conducted | Total No. of successful FLD trials for the year 2004-05 | No. of FLD trials vitiating due to bad weather conditions |
|-------|---------------------|-----------------------------|---|---|
|       | <b>NORTH ZONE</b>   |                             |   |   |
| 1.    | PAU, Faridkot       | 60                          | 58  | 2   |
| 2.    | CCSHAU, Hisar       | 75                          | 75  | -   |
| 3.    | RAU, Sriganaganagar | 20                          | 20  | -   |
| 4.    | MPUAT, Banswara     | 25                          | 25  | -   |
| 5.    | CICR, Sirsa         | 30                          | 30  | -   |
| 6.    | CSUAT, Kanpur       | 7                           | 6   | 1   |
|       | <b>Total</b>        | <b>217</b>                  | <b>214</b>  | <b>3</b>  |
|       | <b>CENTRAL ZONE</b> |                             |   |   |
| 6.    | GAU, Surat          | 51                          | 38  | 13  |
| 7.    | JNKVV, Khandwa      | 115                         | 115   | -   |
| 8.    | PDKV, Akola         | 50                          | 46  | 4   |
| 9.    | MAU, Nanded         | 70                          | 70  | -   |
| 10.   | MPKV, Rahuri        | 40                          | -   | 40  |
| 10.   | OUAT, Bhawanipatna  | 129                         | 129   | -   |
| 11.   | CICR, Nagpur        | 50                          | 50  | -   |
|       | <b>Total</b>        | <b>505</b>                  | <b>448</b>  | <b>57</b>   |
|       | <b>SOUTH ZONE</b>   |                             |   |   |
| 12.   | ANGRAU, Guntur      | 40                          | 40  | -   |
| 13.   | UAS, Dharwad        | 40                          | 33  | 7   |
| 14.   | TNAU, Coimbatore    | 72                          | 72  | -   |
|       | <b>Total</b>        | <b>152</b>                  | <b>145</b>  | <b>7</b>  |
|       | <b>Grand Total</b>  | <b>874(100.00)</b>          | <b>807(92.33)</b>                                       | <b>67(7.67)</b>   |

## **RESULTS OF FRONTLINE DEMONSTRATIONS NORTH ZONE**

### **PAU, Faridkot**

At this station, moderate attack of jassid was recorded during the season. The thrips population was higher during June-July. The whitefly incidence was maximum 11.21 adults per three leaves in September end. The cotton aphid also appeared in the end of September. The bollworms incidence was comparatively low during the season. Only negligible infestation of American bollworm was recorded late in the season. Spotted and pink bollworms incidence was moderate. In the end of the season, tobacco caterpillar attack was recorded.

## **Progress of work:**

Punjab Agricultural University has recommended F-846, F-1378, LH-1556, F-1861 (varieties) and LHH-144(hybrid) of American cotton (*G.hirsutum*) and LD-327 and LD-694(varieties) and Moti (hybrid) of desi cotton (*G.arboreum*) for general cultivation in cotton growing region of the state. A number of improved production and protection technologies have been recommended. To demonstrate the impact of improved varieties and package of practices (production and protection) on the yield of cotton crop, a total of 60 Front Line Demonstrations were conducted at farmer's fields during 2004-05.

## **Improved varieties**

In all the demonstrations, the recommended improved varieties of both *G. hirsutum* and *G.arboretum* recorded higher seed cotton yield than the check variety. It was observed that there was 17.4, 25.0, 12.9, 16.6, 8.8, and 39.0 per cent increase in the mean yield of F-1861, LH-1556, F-1378, LD-694, LD-327 and Moti, respectively as compared to yield in the respective check plots. The range of increase in mean seed cotton yield was 8.8 to 39.0 per cent. Among the 29 demonstrations conducted to demonstrate the effect of time of sowing, the increase in yield was 18.4, 16.6 and 12.2 per cent over the check for F-1861, LD-694 and F-1378, respectively. Similarly, out of eight trials on weed control, the American cotton variety (F-1861) recorded the highest increase over the check plot (12.3%) as compared to LH-1556 (2.9%) and LD-327 (5.95%). The trial on optimum plant population of F-1861 also recorded 13.8% increase in seed cotton yield over the farmers' practice. A total of eleven demonstrations on balanced nutrition were conducted for the varieties Moti, F-1861 and LH-1556. an yield increment in the range of 22.0-47.8% was recorded over all the varieties. Similarly, thirty-one demonstrations were conducted to emphasize the significance of integrated pest management. The increase in the yield over that of check was 16.9 and 12.9 per cent for F-1861 and F-1378, respectively.

## **Krishi Melas/Kisan Melas**

Four *Krishi Melas / Kisan Melas* were organized during the period under report

## **Surveys/monitoring under Core Implementation Committee (CIC) and Monitoring Committee (MC):**

An inter disciplinary team of the scientists was constituted by the Director of Extension Education, PAU, Ludhiana, at state level in collaboration with State Dept. of Agriculture, Punjab to survey the cotton crop for the assessment of crop condition, incidence of insectpest and diseases in the cotton belt of Faridkot, Mukatsar, Ferozepur, Bhatinda and Mansa etc.

## **Village Concept Scheme:**

Apart from this, a Village Concept Scheme was also constituted by the Director of Extension Education, PAU, Ludhiana, at state level in collaboration with State Dept. of Agriculture, Punjab and Wardhman group of Industries. Under this scheme, after preliminary

surveys of the cotton belt, five villages namely Peori, Daula, Kotbhai (hub), Madir and Sahib Chand of Mukatsar district were adopted and provided technical know-how for maximizing seed cotton yield with expenditure. Through extensive surveys of these villages, information regarding agricultural statistics in general and of cotton cultivation in particular was collected. This included sowing period, varieties sown, spacing for different varieties, seed rate, irrigation, rainfall etc. Soil sampling and testing for water and nutrients was also carried out. The university specialists made a total of 28 units during the crop growth period. A training camp to train the cotton growers of the area was also organized under this scheme at PAU, Regional Station, Faridkot.

### **HAU, Hisar**

Seventy five front line demonstrations were allotted to Main Cotton Research Station, CCS HAU, Hisar during the (2004-2005) crop season.

#### **Season and the effect:**

Minimum insect pest and disease damage was observed through out the crop season. Cotton Leaf curl virus disease incidence was observed at the early stage in susceptible and undescript varieties but its effect could not hamper the seed cotton yield. At sowing and early growth stage, good rainfall resulted in good plant stand and growth. Whereas, less rainfall as compared to normal during flowering and fruiting stage resulted in good boll setting and very good seed cotton yield. There was less incidence of CLCuV disease, and American bollworm through out the crop season but spotted boll worm remained during the whole crop season. In the month of October, there was heavy attack of tobacco leaf cater pillar but there was no adverse effect on the seed cotton yield.

#### **a) Arboreum varietal trials:**

Eight Arboreum varietal trials were laid out during this crop season. In this demonstration, HD 324 prerelease variety was compared with check variety HD 123 and local check variety. Average yield of HD 324 was obtained ( $1951\text{kg/ha}^{-1}$ ) over variety HD 123 ( $1892\text{ kg ha}^{-1}$ ) as compared to farmers local check ( $1780\text{ kg ha}^{-1}$ ). Highest seed cotton yield ( $2701\text{ kg ha}^{-1}$ ) was obtained by Sh. Raja Ram of village Begu District Sirsa, which was 15% higher than local variety adopted by him and 52% higher than average yield of farmers' own varieties.

#### **b) Hirsutum varietal trials:**

Ten hirsutum varietal demonstrations were undertaken with pre release variety H 1226 and recommended variety H 1117, H 1098 along with farmers' own variety. It was observed that H 1226 gave highest seed cotton yield ( $3200\text{ kg ha}^{-1}$ ) over the other varieties and farmer variety on the field of Kirpal Singh of Village Perra wali in Hisar District. On an average, H 1226 gave 12.2, 15.0, and 24.4 per cent higher seed cotton yield as compared to H 1117, H 1098 and farmers local variety respectively.

**c) Hirsutum hybrid trials:**

Nine hirsutum hybrids trials were conducted during this crop season. One prerelease hirsutum hybrid HHH 287 was compared against HHH223 recommended check and the local hybrid used by farmer. HHH 223 hybrid seed cotton yield ranged from 2100 to 2600 kg ha<sup>-1</sup> as compared to HHH 287 from 2000 to 2550 and farmers own hybrids ranged from 2100 to 2300 kg ha<sup>-1</sup>. On average basis HHH 223 recorded 1 and 8.1% higher seed cotton yield than HHH 287 and local check respectively. A maximum of 3200 kg/ha seed cotton yield of HHH 223 was obtained on the field of Abhey Ram, which was 42.8% higher than farmer practices.

**d) Yield Maximization of Desi Hybrid AAH-1 and hirsutum cotton:**

Thirteen demonstrations on yield maximization of AAH-1 Desi cotton hybrid were laid out at different Villages of Sirsa, Fatehabad, Hisar and M. Garah districts of Haryana. Full package of practices were followed by the farmers. Highest seed cotton yield (3900 kg/ha-1) was obtained from AAH-1 against (2550 kg ha-1) local hybrid at the farm of Sh.Satbir Singh Village Dhani Chasian District. Fatehabad. The average seed cotton yield of AAH-1 was 26.4% higher against local hybrid planted by the farmers.

**e) Demonstration of cotton varieties H 1117, H 1098 & HD 123**

Fourteen hirsutum cotton and one arboretum cotton demonstration on yield maximization were laid out on farmers' field in which all recommended practices were adopted by the farmers. It was observed that Sh. Raj Kumar of Village Kanwarpura Distt. Sirsa obtained highest yield of H 1117 (3000 kg ha<sup>-1</sup>), which was 20% higher over farmer practices. In case of Desi variety HD 123 maximum yield of 1260 kg/ha was obtained where as highest yield of 1630 kg/ha was obtained in case of variety H 1098.

**f) Intergrated Pest Management:**

Four demonstrations on the above aspects were carried out by Dr. P.D. Sharma, Sr.Entomologist cotton on farmer's field. The following technology was depicted i.e. balanced use of fertilizers, new resistant varieties and monitoring based pesticide use. Highest seed cotton yield of H 1226 (2500 kg/ha<sup>-1</sup>) were obtained against farmer practices HS-182 (1600 kg ha<sup>-1</sup>). It was 56% higher against local practices.

**g) Hybrid seed production of AAH-1 by farmers:**

Sixteen FLDs were conducted on hybrid seed production technology of AAH-1 in Sirsa, Fatehabad, Hisar and Mohindergarh districts of Haryana State. The parental seed of (Male & Female) half to one acre was given to the farmers. All concerned farmers were imparted training on seed production. The range of seed production at farmer's field was from 100 kg to 800 kg/ha. The highest production of 800 ka/ha seed of AAH-1 seed was achieved by Pawan Monga of Baarseen Village of Fatehabad Distt. The cost of seed production ranged from Rs. 80/kg to Rs. 150/kg. at farmers field.

## ***Extension Activities***

### **State Level Training**

Two state level trainings on hybrid seed production of arboretum cotton (AAH-1) were organized at main campus CCs HAU, Hisar. Parental seeds of (Male & Female) hybrid AAH-1 were also distributed to the farmers. About 500 farmers were benefited with training programme.

On 19.07.04, State level practical field training was organized on seed production technique of Desi hybrid AAH-1 at Cotton Research Area, Department of Plant Breeding HAU, Hisar. Similarly, one training in the month of July was organized at HAU Cotton Research Station, Sirsa for the farmers of Sirsa and Fatehabad district. In this training farmers from adjoining states i.e. Punjab and Rajasthan also participated.

### **Cotton Field Day/Kapas Diwas**

During 2004-2005 crop season, six cotton field day/Kapas Diwas were organized to transfer knowledge to the large number of farmers in traditional and non traditional cotton growing areas of different districts in Haryana State.

### **RAU, Sriganagar**

Among cell sap sucking insect-pests, the population of jassid was found comparatively lower than whitefly and thrips. During the entire crop season, leafhopper could not cross ETL. Population of thrips was found comparatively higher on an early crop growth period. In the month of July and August, pest density ranged in between 8.70 to 17.00 as against 0.50 to 5.33 adult/3 leaves in September and October.

Among bollworms, spotted *Erias insulana* and spiny *E. vitella* were observed to dominate over the other during the crop season. The peak activity of the population was recorded in the month of August as population being 0.40 to 0.88 larvae/ plant as against 0.22 to 0.65 in July and 0.05 to 0.45 larvae/ plant in September and October. A meager larval population of *H. armigera* was noticed in early August and continued up to 40<sup>th</sup> std week of October. Comparatively higher population was recorded in the month of September (0.10 to 0.80 larvae / plant) as against 0.10 to 0.30 in early crop growth period.

### **Progress report of Front line demonstration on cotton:**

Twenty front line demonstrations were conducted during *Kharif* season of 2004 on different farmers' fields of Sriganagar and Hanumangarh district. Variety RS-2013 was planted in demonstration at farmers' field in improved package whereas in local package Bikaneri nerma, RST -9 and F-846 and others were used by the farmers at their own level. One Cotton Day was organized at Agricultural Research Station, Sriganagar. On this occasion, cotton scientists and Director CICR, Nagpur delivered their lecture on improved technology to the FLD farmers. Two field day programmes on cotton crop were

organized at Sriganganagar. Farmers actively participated in the group discussion, scientists clarified their doubts. In front line demonstrations, improved package recorded on an average 27.08% higher seed cotton yield over local package.

### **MPUAT, Banswara**

AICCIP sub-centre Banswara is engaged in development of improved varieties and hybrids of *G. hirsutum* and *G. herbaceum*. The cultivator in Southern Rajasthan is mainly dependent on monsoon rains and the sowing is commenced at onset of monsoon. The habitat of the area is scheduled tribes with poor socio-economic condition and awareness. The land holding size is small to medium and fields are undulated. The prevailing soil condition of black cotton soil suits with the cotton cultivator. Traditionally long duration *G. herbaceum* varieties were under cultivation in rainfed situation but with the commencement of irrigation project need was felt to take two crops in a year. Looking to the need of area the project centre recommended high yielding genotypes that suits in double cropping pattern like LRA-5166, RST-9, H-6 and H-8 and now they are well adopted by the cotton cultivators. At present, more than 50% cotton area of district Banswara is under hybrid H-8. Long linted hybrid DCH-32 is also in sizable area due to its high sale price. Insect infestation has become a serious problem to tribal cultivators. To combat this, they are used to use higher doses of insecticides and their different combinations. Besides they are poor in following proper agro-technologies to harvest high seed cotton yields. Looking to need of local cotton cultivator, 25 front line demonstrations were allotted by project headquarter and they were framed to demonstrate following technologies.

1. H-8 demonstration on integrated crop production management practices with IPM technology.
2. H-6/H-8 demonstration on integrated crop production management practices.
3. H-8+maize demonstration on integrated crop production management practices.

In Cotton, use of machinery is found to save time, labour and money. This not only improves crop health but also reduces cost of cultivation. Cotton cultivation is done in wider rows so the tractor drawn implements can easily be used in interculture and other field operations. Use of insecticides is most common in cotton. Improved sprayers are found to increase their efficiency in their uses.

### **SEASON AND CLIMATIC CONDITION**

The year with regard to climatic condition was an abnormal year; initially there was a dry spell of one month just after initiation of monsoon rains. This situation leads to poor canopy at an initial stage and results in shedding of all the foliages. The plants were also sub-merged in water and no interculture operations were taken in that period. However, pest incidence throughout crop period was manageable by following routine plant protection measures. A total of 1134.5 mm rainfall was received during the year.

## IMPACT ANALYSIS

### A. Reduction in insecticide spray

| Condition                 | Spray schedule as per package | Insecticide spray normally followed | Reduction in cost for sprays/ha assuming Rs. 500/- per spray |
|---------------------------|-------------------------------|-------------------------------------|--|
| Normal cotton cultivation | 06                            | 10                                  | 2000/-   |

### B. Awareness in modern technology

- Convinced with IPM technology especially by use of Pheromone traps.
- Convinced with application of DAP at the time of sowing.
- Appraised with judicious use of insecticides at ETL.
- Realized 1:1 cotton-maize intercropping than scattered maize in cotton.
- Appraised with use of improved implements.

## TRANSFER OF TECHNOLOGY

### i. FLD on integrated crop production management practices with IPM technology

Out of twenty five front line demonstrations allotted to this centre, seventeen were conducted to demonstrate integrated crop production management practices with IPM technology on cotton hybrid H-8. These demonstrations were conducted in villages Tamtia, Chobiso ka Padla, Siyapur, Palodra and Thikaria. The Astha model of IPM was adopted to demonstrate IPM technology. One setaria row after every ninth row of cotton was conducted to attract birds for biological control of insects. All the integrated crop production technologies for higher yield were also demonstrated in these FLDs.

### ii. FLD on integrated crop production management practices

Five front line demonstrations in village Hameerpura, Karji, Padikhurd, Padikala and Ganoda were conducted to demonstrate integrated crop production management practices of cotton on hybrid H-6 and H-8. Use of chemical fertilizer regularly on cotton field to harness maximum yield potential becomes a regular practice. Use of FYM, thrice a year helps to maintain soil health and increase in yield levels. Foliar spray of Zinc Sulfate was applied for good health of leaves and for micro-nutrients availability. Requirement of chemical fertilizer at proper time and crop stage was demonstrated.

### iii. FLD on integrated crop production management practices with maize as an intercrop

Three front line demonstrations in village Tamtia, Galkiya and Lasodia were conducted to demonstrate integrated crop production management practices of cotton with maize interculture. These demonstrations were conducted to educate and demonstrate proper interculture of maize rows in cotton.



## **YIELD PARAMETERS**

### **i. FLD on integrated crop production management practices with IPM technology**

The higher seed cotton yield was observed in field of Naharsingh/Nathusingh (2345 kg/ha) followed by Nanula/Kachru (2325 kg/ha) and others. The yield of control plot in Naharsingh/Nathusingh and Nanulal/Kachru fields were 2200 and 2020 kg/ha, whereas, the highest per cent increase was observed in demonstration field of Kodarla/Dhulji village Garia (23.51%). The seed cotton yield in all FLDs ranged from 2345 kg/ha (Naharsingh/Nathusingh) to 1745 kg/ha (Amritlal/Galba).

### **ii. FLD on integrated crop production management practices**

Five demonstrations were conducted to demonstrate integrated crop production management practices on hybrid H-8. The higher yield was observed on Mogji/Nathu (2315 kg/ha) followed by Pratap/Premji (2250 kg/ha). The yield in control plot of Mansingh/Rangji was 1950 kg/ha followed by Mogji/Nathu (1912 kg/ha). The highest per cent increase was observed in demonstration field of Pratap/Premji village Karji (23.28%).

### **iii. FLD on integrated crop production management practices with maize as an intercrop**

Three demonstrations for cotton+maize interculture practices were conducted. The highest return in interculture operation was observed at Roopji/Mogji FLD site with the yield of 1745 kg/ha for cotton and 1925 kg/ha for maize.

## **IMPACT OF FLD ON PRODUCTION**

### **i. Impact of integrated crop production management practices with IPM technology**

This area of southern Rajasthan has a potential of yield exploration of cotton hybrids. Indeterminate use of insecticides, their mixtures varying doses, poor quality of insecticides and improper knowledge of pest and predators disturbed the ecological balance of cotton pest flora in the area. This year seventeen IPM demonstrations were conducted in villages Tamtia, Chobiso ka Padla, Siyapur, Palodra and Thikaria. The highest profit of Rs. 6420/- per hectare was observed on Kadarlal field.

### **ii. Impact of integrated crop production management practices**

Cotton cultivators in command area are supplying higher doses of chemical fertilizers to harness maximum yield potential. Five demonstrations on integrated crop production practices in cotton were demonstrated this year. The highest monetary return by adopting improved technology was realized at Mogji/Nathu (Rs. 34725/- per hectare).

### **iii. Impact of integrated crop production management practices with maize as an intercrop**

Maize being a traditional crop is taken within the cotton rows or sometimes in scattered corn. This

crop is taken in rainfed eco-system to avoid risk of monsoon failure. Three demonstrations were conducted to educate farmers to take maize as intercrop in 1:1 ratio of provide proper spacing to both the crops. A higher yield for cotton (1745 kg/ha) and maize (1925 kg/ha) was observed at the site of Roopji in village Tamtia.

## **INFORMATION ON FIELD DAYS/TRAININGS**

One field day dated 05-09-2004 in villages Chobiso ka POadla and six officers' trainings under ICDP programme were conducted.

### **CICR, Sirsa**

The northern cotton-growing zone consisting of Haryana, Punjab and Rajasthan is considered as cotton basket in India. This zone is most potential cotton growing zone, having the productive soil and almost entirely irrigated. The main crop grown in this zone are cotton, wheat, paddy, mustard, etc. The cotton – wheat rotation system is prevalent in the zone. The popular cotton varieties and hybrids being cultivated are: varieties HS-6, H-1098, H-777, F846, F 1861, RST 9, RS810, RS 875, RS 2013, RG 8, HD 123, HD 107 and LD 327. Hybrids are Om Shankar, Dhanlakshmi, Fateh, AAH-1, LHH-144, CSHH 198, CICR 2, etc and hybrids from private sector are – Ankur 651, Bunny, Sandcot 35, Ganga Kaveri, Rasi etc.

Since last two years the yield has been recoded considerably high in the zone. The reasons for higher yield during the years were favourable weather, dry during the reproductive phase of the crop and incidence of American bollworm and leaf curl virus disease seen in pockets. The spodoptera is also being seen in the fields when the crop was over.

The Sirsa Station conducted thirty front line demonstrations. All the 30 farmers had one-hectare area under each demonstration except the seed production demonstrations. For comparison, control plots were taken in each demonstration.

### **Showcased technologies on which FLDs were conducted on cotton.**

A number of technologies have been developed by the scientists to enhance the production of cotton. Now these are being tested and confirmed at the farmers' field under FLD Programme at different locations for its dissemination. Different aspects are:

- Demonstration of resistant /tolerant hybrid i.e. CSHH 198 and CICR 2
- B.. IPM (Integrated Pest Management) Technology
- IRM (Insecticides Resistance Management)
- Hybrid seed production of CICR 2 and CSHH 198 at farmers' field

## **Progress Report of FLDs conducted on cotton**

### **a) Demonstration of hybrid CSHH 198**

Hybrid CSHH 198 was distributed among four farmers. In the FLD plots only 3.5 sprays were done while in farmers practice seven sprays were done. For yield comparison, the hybrid CSHH 198 out yielded the local cultivars grown by the farmers. There was an increase of 17% whereas in case of CICR 2 the sprays were also less as compared to local cultivars while there was an increase of 20%. The average seed cotton recorded 28.0 qt from using recommended hybrid in the demonstration and average of 23.9 qt was recorded using traditional or non-descriptive varieties or other hybrids. However, the maximum yield was obtained in case of Nirmal Singh who has obtained 33qlha yield. The average yield difference between treatments and farmers practice plots was 4.1qt. By adopting this technology, we can get an additional amount of more Rs. 7380/- ha (Price of seed cotton in the market Rs.1800/- per quintal). While in case of CICR 2 the average yield difference was of 5.2q (Price of seed cotton in the market Rs.1575/- per quintal).

### **b) Integrated Pest Management Technology**

The performance of suitable cultivars/hybrid under IPM technology was demonstrated at five farmers' field. On the basis of average, it is indicated that 2.7 q/ha more yield is obtained by following IPM strategy and even the number of sprays are also less as compared to farmers practice. The average net profit over farmers practice was Rs. 4860/- per ha. Increase in yield was 14.75% over the farmers practice.

### **c) Demonstration on IRM Strategy**

The strategy was evaluated at 13 farmers' field. It was noted that number of pesticides sprays were more in control plot than treatment plot. Seven sprays were given in control plot whereas it was only 3 in treatment plot. Thus, it is concluded that a farmer can get an average of 4.1qlha more yield with less spray and minimum environment pollution. That the new strategy IRM advised to the farmers is aimed at reducing cost on pesticidal spray and to manage resistance in insect against insecticides. The farmers of these villages and of the neighbouring villages assured that they are going to adopt this strategy next time and were willing to have FLDs in their villages for getting the knowledge about the strategy.

### **d) Demonstration of Hybrid seed production at farmers' field**

Hybrid seed production programme of CHSS 198 was taken by Sh. Subhash Chander, Village Nezia Khera and of CICR 2 by Sh. Bharpoor Singh of Bhagatpura village (Rajasthan), Jeet Singh of Rangri (Sirsa) and of Sh.Charanjeet Singh Nezia Khera (Sirsa). Sh. Subhash Chander obtained 1.6 qt hybrid seed of CSHH 198 from one acre. This station trained the farmers for every important step involved in hybrid seed production such as sowing procedure, plant ratio (female and male), and distance of parental population, rouging, emasculation, pollination etc. The scientists of this station regularly monitored the crossing program at the farmers' field. Other farmers also showed keen interest for taking hybrid seed

production in next season at their own field. The tentative rate of hybrid seed obtained is Rs. 600/- kg. A Kisan Mela was organized on 23.7.04 at Anaj Mandi, Sirsa to exhibit the technologies of the station. An IPM Kisan Mela was organized at village Dhingsara, Fatehabad. The street plays were conducted on IRM strategies in three different villages viz., Fatehpuria (Sirsa), Ghirai (Hisar) and Jandli Khurd (Fatehabad). The farmers and villagers thronged, at the venue of the play and watched it seriously and understood the theme behind the play. Everyone appreciated the play and its theme.

A FLD on CIRCOT technology was conducted at village Jodhpuria. The dignitaries came from CIRCOT, Mumbai, Nagpur and Coimbatore spoke on Cotton Stalk Utilization. They told the farmers that the stalks are used to prepare the boards of various kinds. CIRCOT displayed different types of boards prepared from cotton stalks. They also distributed the literature on cotton stalk utilization. The expert from CIRCOT, Mumbai elaborated the procedure for making the wooden boards from cotton stalks, they also gave information regarding the industries that are making them. Later in the afternoon there was meeting with factory people. The factory people had discussion regarding their problems. The experts told regarding subsidies for ginning factories and their upgradation.

### **Success Story:**

Front Line Demonstrations were conducted in the fields of Sh.Charan Jeet Singha and Sh. Subhash Chander of Nezia Khera. They were given FLD on hybrid seed production. Both the farmers got almost equal return. They were trained at the station and their fields were regularly monitored. Sprays were based on the ETLs of pest and diseases. They are very much convinced about this technology. They are also advocating this technology to other farmers of neighbouring villages. Among all farmers, Sh.Charan Jeet Singh and Sh. Subhash Chander earned good profit. They were satisfied with their efforts and thanked CICR, Regional Station, Sirsa scientists for providing the technology.

### **Constraints Analysis**

Following constraints were identified based on the information provided by the different farmers.

- Cultivation of non-descriptive variety/seed from other farmer.
- Poor coverage of certified seed.
- Optimum time of sowing.
- Absence of proper plant population in the field
- Absence of plant protection application based on surveillance and ET levels.
- Non-adoption of recommended plant protection measures.

### **CSUAT, Kanpur**

Almost all the cotton growing area is irrigated, however the average productivity is about 154 kg lint/ha which is far below as against the national productivity of 230 kg lint/ha. Thus, there is huge shortage of cotton. The major constraints that limit productivity of cotton in

the state are non-availability of essential inputs like quality seed of recommended varieties, fertilizers, chemicals and lack of spread of newly developed production technologies among the growers. South-western plain region of U.P. is suited for cultivation of medium and superior medium staple category of cottons. Aligarh, Mathura, Agra, Hathras and Kanpur (Dehat) are important cotton growing districts.

### **Programme for 2004-2005**

Seven Front Line Demonstrations of one acre each were conducted with recommended high yielding varieties of Vikas (American cotton) & CAD-4 (Desi).

### **Location of the Demonstrations:**

Seven farmers 5 in Mathura and 2 in Kanpur Dehat were selected and 5 FLDs in Vikas (*G.hirsutum*) cotton and two FLDs in CAD-4 (*G.arboreum*) were laid out to demonstrate the production technologies to enhance the cotton yields in irrigated condition.

### **Mathura:**

The yield level of variety Vikas ranged from 5.5q to 10.00 qlha as against 4.0q to 8.8 q/ha of local desi types by the use of improved packages. On an average of trials, 48.73% increase in yield was recorded than the local practice.

### **Kanpur Dehat:**

The yield level of variety CAD-4 (*G. arboreum*) ranged from 3.0 qlha to 5.25 q/ha. On an average, 41.6 per cent increase in yield was recorded in the improved practice over the local practice, One trial completely failed on account of excessive water logging.

Thus FLD results clearly showed the impact of production and protection technologies for increasing productivity of cotton in the state.

**Kisan mela:** Kisan mela arranged at Kanpur Dehat at Macha Village.

## **CENTRAL ZONE**

### **GAU, Surat**

### **Season and crop condition**

In all, 1668.9 mm of rainfall was received in 64 rainy days. The incidence of aphids was observed in the middle of August and again from end of October till middle of January with very low population throughout the crop period. The incidence of jassids was observed in mid July. It started again from 1st week of August with more or less same intensity and crossed ETL twice during the crop period. The attack of thrips started in the 1st week of August that crossed ETL thrice during crop period. The whitefly appears during 1st week of

October and continued up to January end with very low intensity during crop period. The incidence of *Earias* started from 1st week of August and continued till end of January with more or less same intensity and crossed ETL two times. The attack of *Helicoverpa* was observed in the end of July and continued upto mid January but crossed the ETL once in the season. The incidence of *Pectinophora* started from 2nd week of September and continued upto last week of January. High intensity was observed during 2nd week of November to 3rd week of January with maximum population during 1st week of December. The attack of *Spodoptera* was observed once during end of August. Overall season was moderately favorable for the crop.

### **Krishimelas/ Field Days/ Farmers shibirs etc :**

At. Rana Khirasara, Ta. Ranavav, Dist. Porbandar, At. Unja, Ta. Unja, Dist. Mehsana, At. Bharuch, Dist. Bharuch, At. Majejadi, Ta. Junagadh, Dist. Junag At. Ronvel, Dist. Valsad and. At. Dabhoi, Dist. Vadodara

### **Difficulties in organizing FLD:**

Demonstrations for new varieties is indeed difficult because of wide spread of Bt. cotton area.

### **JNKVV, Khandwa**

1. Seventy-five front line demonstrations on cotton have been carried out during crop season 2004-05 at J.N.K.Y.Y., Regional Agricultural Research Station.

### **Information on the progress of Core Implementation Committee:**

The FLD programme was implemented jointly with the Department of Agriculture, Govt of Madhya Pradesh represented by Sheri Stash Agawam, Deputy Director of Agriculture, Chandra and Dr. S.K. Khamparia, Sr. Scientist (Cotton), JNKVV, Khandwa. The demonstrations were visited thrice jointly and again with the NALMOT team.

### **Percent increase in yield with Improved Varieties /Hybrids.**

The result indicated that the improved technology recorded on an average 15-23% higher kapas yield over farmers' practices.

### **Suitability of cotton hybrids for intercropping with maize (2:1) row ratio.**

The result indicated that intercropping with maize (2:1) row ratio was found more remunerative as compared to sole cotton/ farmers' practices.

## **Percent increase in yield with INM over farmers' practices**

The results revealed that INM recorded on an average 22-39% higher yield over farmers' practices.

## **PDKV, Akola**

During the year 2004-05 the target of 50 Front Line Demonstrations (FLD) were given to this center. In all 50 FLDs were conducted in the area of cotton growing districts of Vidarbha region under rainfed condition. The district wise FLDs conducted are as given below-

### **Krishi Melawa : Two**

One Krishi Melawa (Field day) was organized by this Research Unit, at Bhaurad, Dist. Akola. About 200 farmers from Bhaurad & surrounding villages attended the field day. Another Krishi Melawa was organized at village Vairagad Dist. Buldana. About 185 farmers in the Vairagad & near by villages were actively participated in the Krishi Melawa. Programme was started with the visit to the FLDs on different cotton technologies.

## **Results of the Cotton Front Line Demonstration.**

### **1) Varietal demonstration of pre-released var. AKA-8 Vs. AKA-5 with their recommended package of practices**

Pre-released desi cotton *G. arboreum* variety AKA-8 with its recommended package of practices was demonstrated at 9 locations on farmer's fields to test the yield potential in comparison with released desi cotton variety AKA-5 under rainfed condition. The yield data showed that a pre-released desi cotton variety AKA-8 recorded 17.22 per cent increase over AKA-5 under rain fed condition.

### **2) Varietal demonstration of pre-released var. AKH-8828 Vs. PKV Rajat with their recommended package of practices**

Eight demonstrations on pre-released *G. hirsutum* cotton variety AKH-8828 with its recommended production technology were conducted on farmers' fields to test the yield potential in comparison with PKV Rajat. The yield data indicated that pre-released variety AKH-8828 registered 4.22 per cent more seed cotton yield than PKV Rajat. Besides high yield potential this newly pre-released cotton genotype AKH-8828 is having high ginning outturn, big boll size and less susceptible to sucking pest and pink bollworm.

### **3) Demonstration on Soil management- Sowing of AKH-081 on shallow soil with recommended package of practices**

Though cotton cultivation on shallow soils is being discouraged, farmers are growing cotton on shallow soils also and this is one of the major reasons to lower down the productivity in this area. This center has identified early dwarf *G. hirsutum* variety AKH-081 suitable for

shallow soils in comparison with other hybrids and varieties. In order to popularize this technology, improved American variety AKH-081 with its recommended package of practices was demonstrated at 6 locations on farmers' field to test the yield potential in comparison with farmers' practices with other varieties/hybrids on shallow soil. The yield data reported showed that variety AKH-081 recorded 17.52, 73.33, 5.19, and 26.00 per cent increase over AKA-5, Ajit-II, PKV Hy-2 and Ankur 651, respectively. On an average of 6 demonstrations conducted on shallow soils, AKH-081 with recommended package of practices produced 25.49 per cent higher seed cotton yield over other varieties/ hybrids.

#### **4) *In situ* soil moisture conservation - Opening of ridges and furrows**

In order to see the benefit of opening of ridges and furrows at 30 DAS and to popularize this low cost production technology for *in situ* soil moisture, four demonstrations were organized on farmers' field. On an average this technology has given 9.28 per cent higher seed cotton yield than farmers' practice. The benefit of this technology was more in AKA-7 as compared to cotton hybrids under study.

#### **5) Dry sowing V s. Monsoon sowing**

In order to assess the benefit of early establishment of cotton crop through dry sowing Vs Monsoon sowing and to popularize this low cost production technology, 5 demonstrations were organized on farmers' field. This technology has given overall 19.55 per cent higher seed cotton yield than Monsoon sowing. In all 5 demonstrations, protective irrigations were given in dry sowing Vs Monsoon sowing during crop season.

#### **6) Demonstration on crop canopy management- 2 % Urea at flowering and DAP at boll development stage**

Front line demonstration on foliar application of 2 % urea at flowering and 2 % DAP at boll development stage were conducted on farmers fields in comparison with control (no spraying). This technology intervention was tried on different cotton hybrids like Sandocot-35, Banni, Gabbar, Teja and Brahma. On an average of 6 locations, this technology produced 12.05 per cent more yield than control (no spraying).

#### **7) Inter-cropping with short duration pulses**

Front line demonstration on cotton based inter-cropping system with short duration pulses (green gram) was conducted on farmers fields at 4 locations to assess the performance of this technology in comparison with control (sale cotton crop). Seed cotton yield in cotton + green gram intercropping system was more by 7.18 per cent over sale cotton crop (monocropping system). Impact of this cropping system was more in desi cotton variety AKA-5 as compared with hirsutum cotton hybrids.

Cotton + intercrop gave an average Rs 4875/- per ha additional net monetary return of green gram as compared to sale cotton.



## **Formation of CORE Committee:**

Core implementation committee was formulated and Senior Research Scientist (cotton) was the chairman of this committee. Scientists of the cotton research unit were the members of this CORE implementation committee. Extension agronomist, Director of research, Dr. P.D.K.V., Akola was also the member of this committee. Members of this committee have monitored the fields frequently during the crop season. In Krishi Melavas organized at Bhaurad Dist Akola on 8.11.04 and Ganeshpur Dist Buldana on 3.12.04, the staff of the State Dept. of Agriculture actively participated.

## **MAU, Nanded**

Seventy Demonstrations were conducted on farmers' field on cotton crop during kharif2004-2005.

## **Demonstration performance of American variety NH-545, PH-348 and desi variety PA-255 in comparison with American hybrid NHH-44.**

Results indicated that, on an average of five FLDs, variety PA-255 gave 1355 kg/ha and NHH-44 660kg/ha seed cotton yield. The desi variety PA-255 (Turab) gave 102.2% increased seed cotton yield over the seed cotton yield of NHH-44. In another set, on an average of five FLDs of NH-545 and NHH-44, the variety NH-545 and NHH-44 gave 768 and 660 kg/ha seed cotton yield respectively. The American cotton variety NH-545 gave 16.36% increased seed cotton yield over American hybrid NHH-44, while in third set, on an average five FLDs of American variety PH-348 gave 762 kg/ha and NHH-44 660 kg/ha seed cotton yield. The American variety PH-348 gave 15.45% increased seed cotton yield over the hybrid NHH-44.

## **Demonstration on spraying of 2% DAP at 45 and 75 days after sowing in rainfed cotton.**

The result indicated that the seed cotton yield increased ranging from 11.11 % to 18.84% over no spraying of DAP @ 2% at 45 & 75 days after sowing. The average increase in seed cotton yield was 15.75% over control.

## **Demonstration on spraying of micronutrients i.e. MgSO<sub>4</sub> @ 0.2% at 45 and 75 days after sowing in relation to seed cotton yield**

The results of demonstrations indicated the beneficial effects of spraying of micronutrients MgSO<sub>4</sub> @ 0.2% at 45 & 75 days after sowing on seed cotton yield of hybrid HH-316. The seed cotton yield increased ranging from 2.73% to 14.08% over no spraying of micronutrient MgSO<sub>4</sub> @ 0.2% at 45 & 75 days after sowing. The average increase in seed cotton yield was 10.27% over control.

### **Demonstration on Integrated Nutrient Management for rain fed cotton hybrid NHH-44.**

The results of demonstration showed the effectiveness of adoption of INM in rain fed cotton for enhancing the seed cotton yield of hybrid NHH-44 under rainfed condition. The seed cotton yield increased ranging from 20.96% to 43.93% over no adoption of INM practices. The average increase in seed cotton yield of INM was found 31.39% over no adoption of INM on farmers' field.

### **Demonstration on inter cropping of black gram in rainfed cotton.**

Results indicated that additional monetary returns ranging from Rs.1349 to Rs. 2759/ha without affecting seed cotton yield was obtained due to adoption of intercropping of black gram in cotton over sole cotton crop. On an average, additional monetary returns of Rs.2132/ha has been obtained due to adoption of intercropping of blackgram in cotton over sole crop of cotton.

### **Demonstration on strip cropping of Red gram (6:2) ratio in rainfed cotton hybrid 88-44.**

Results showed that the additional monetary returns ranging from Rs. 2110 to Rs. 3972 / ha was obtained without affecting seed cotton yield by adopting strip cropping of Red gram in cotton. On an average additional monetary returns Rs. 2875/ha has been obtained by adopting strip cropping of Red gram in rainfed cotton over sole cotton crop.

### **Demonstration on rainwater conservation techniques in rainfed cotton**

The results clearly showed the benefit of rainwater conservation practice on farmers' field. The seed cotton yield increased ranging from 21.25% to 33.93% due to adoption of rain water conservation practice over no adoption of rain water conservation practice. The average seed cotton yield increase of 25.88% was obtained over control (only normal hoeing and without protective irrigation).

### **Demonstration on IPM in rainfed cotton.**

The results clearly indicated the beneficial effect of adoption of IPM practices on farmers' field. The farmers obtained increased benefit ranging from Rs. 3602/ha to Rs. 9998/ha due to adoption of IPM practices over non-IPM practices in rainfed cotton. On average, farmers got additional benefit of Rs. 6829/ha due to adoption of IPM practices over non-IPM practices in rainfed cotton.

### **Demonstration on optimum plant population for rainfed cotton**

Adoption of recommended plant population of 27,777 pl/ha (60cmx60cm) increased the seed cotton yield ranging from 20.00% to 54.54% over adoption of farmers local practice of 90cmx90cm spacing (12345 pl/ha). The average increase in seed cotton yield due adoption of optimum recommended plant population of 27,777 pl/ha (60cmx60cm) was 35.29% under

rainfed condition over adoption of lower plant population of 12345 p1/ha (90cmx90cm).

### **Brief Report on Krishi Melawa :**

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**Pre-seasonal Krishi Melawa** on cotton crop was organized at village Sayala: Tq. Loha Dist. Nanded on 2.6.2004. Dr. Y.M. Pawar, Vice-Chancellor, M.A.D., Parbhani was the chairman of Krishi Melawa. Dr. KK Zote, Director of extension education, M.A.U., Parbhani Dr. Pogulwar Joint Director, Agril Division Latur, Shri. S.L. Jadhav superintendent Agril. Officer State Agril Department and progressive farmer Shri Ramrao Reshmaji pawar attended Krishi Melawa and guided the farmers in relation to recent developments in cotton crop particularly on organic farming including INM and IPM technology. About 1500 farmers and extension workers of Agril. Department from the surrounding areas attended the Krishi Melawa.

### **MPKV, Rahuri**

The Rahuri center has conducted 40 (Forty) FLDs on summer irrigated cotton during 2004-05. The sowing of summer irrigated cotton of FLDs were done during the period 18/3/2004 to 25/5/2004. This wide range of difference in sowing period was due to unavailability of irrigation water, because of meager rainfall received during last three years. Till August, the crop was normal. Thereafter, unusual and unexpected rainfall was received during September - October 2004 (718.50 mm in 40 days) due to which there were heavy incidence of boll rot, shedding of fruiting parts and bolls. Further farmers could not harvest the opened bolls of the first picking.

Thus produce of 1<sup>st</sup> picking was almost caught in heavy rains and subsequent pickings were also hampered. This has resulted in tremendous losses in seed cotton yield. Thus yield of good seed kapas is far less than state as well as national averages. Hence the condition of FLDs at M.P.K Y. Rahuri has been treated as vitiated.

### **OUAT, Bhawanipatna**

Cotton is grown as a non-traditional crop in western and southern parts of Orissa by and large under rainfed condition during Kharif season. The area under cotton has gone up considerably from 9790 ha in the year 1950 to 63,254 ha in 2001-02 but later declined to 29,490 ha for the next two years. However, the area under cotton during 2004-05 was 48,000 ha. There is potential for cotton cultivation upto 2 lakh ha. Cotton is grown in 18 districts, the major being Kalahandi, Rayagada, Bolangir and Gajapati. The entire state cultivates only long and extra long staple *hirsutum* cottons. The range of price varied from Rs. 1850/- to Rs. 1950/- per quintal during the current year.

### **Integrated Pest Management:**

Sixty four demonstrations laid out in Kalahandi, Rayagada and Bolangir districts under rainfed situation to popularize I.P.M. technology created immense awareness among the farmers regarding manipulation of agro-system to make it less favourable to pests and more favourable to their natural enemies and to delay pest population increase for sustainable cotton

production. The different I.P.M components include seed treatment with Imidacloprid, use of bio-rationals HaNPV/neem, use of Endosulfan before 90 DAS, monitoring of bollworms with pheromone traps, growing of border/trap/eco-feast crop like marigold, castor, cowpea and maize.

The cost of cultivation of farmers practice was higher than the I.P.M. demonstration with both Bunny and Surabhi seeds but farmers obtained higher cost-benefit ratio in I.P.M. demonstrated plots than their own practice. The I.P.M. with Bunny showed an average cost – benefit ratio of 1:1.41 compared to 1:1.13 in farmers practice in the districts of Kalahandi, Rayagada and Bolangir. Similarly, I.P.M. with Surabhi recorded higher cost-benefit ratio of 1:1.02 in contrast to 1:0.87 in conventional practice. Highest cost-benefit ratio of 1:1.72 and 1:1.20 was recorded in Rayagada district with Bunny hybrid and Surabhi variety respectively.

### **Integrated Nutrient Management:**

Thirty-six front line demonstrations (FLDs) were organized in districts of Nabarangpur, Bolangir and Kalahadi for popularizing improved variety Surabhi and Bunny integrating with I.N.M technology. The I.N.M components include integrated use of organic and inorganic fertilizer, spraying of plant growth regulator and 2% DAP foliar spray for quality cotton production.

The FLD farmers using Bunny hybrid with I/N.M technology secured a net profit of Rs. 18,039/- in contrast to a net profit of Rs. 15,766/- with farmers' practice. Thus, FLD farmers obtained a net return of Rs. 1.39 for each rupee invested on cultivation of Bunny hybrid with I.N.M technology. The highest net return of Rs. 1.53 for each rupee invested was recorded in Kalahandi district. A long staple variety Surabhi was introduced in the same districts as mentioned above both in I.N.M demonstration and farmers practice. The FLD farmers secured an average net income of Rs. 10,877/- while in farmers practice the net return was Rs. 9,474/-. FLD farmers with I.N.M obtained a net return of 0.93 for each rupee invested on cost of cultivation of Surabhi while the same farmer with his own practice realized Rs. 0.87 only.

### **Performance of Surabhi and Bunny:**

The cotton farmers of major cotton growing districts of Orissa cultivate only long staple *hirsutum* cottons such as Savita, Bunny, Sri Tulasi, Dhanno, Gabbar, Atal, etc. The new long staple *hirsutum* variety, Surabhi was introduced in the FLD demonstration as a component in the I.P.M. and I.N.M demonstrations. The average yield of Bunny and Surabhi in I.P.M. plot was 17.03 q/ha and 12.73 q/ha respectively. Similarly in I.N.M demonstration, Bunny recorded an average yield of 15.9 q/ha while Surabhi produced 11.64 q/ha. Hence, Bunny recorded an overall additional increase in yield of 33 and 36 per cent over Surabhi with I.P.M. and I.N.M technologies respectively taking all the demonstrations into considerations.

### **Extension activities:**

A *Krishi mela* was organized at Bhawanipatna on 02-03-2005 in which 300 farmers from major cotton growing districts of Orissa i.e Kalahandi, Rayagada, Bolangir and Nabarangpur participated. Prof. (Dr.) B. Senapati, Hon'ble Vice-Chancellor, O.U.A.T,

Bhubaneswar was the chief guest on the occasion and he released a Video CD on I.P.M. in cotton. A six-page folder on American bollworm management was also released on the occasion by the Dean of Research, O.U.A.T, Bhubaneswar. Officials from State Agriculture Department, Revenue Department, State Bank of India, Insurance Companies, Seed dealers and the Press attended the occasion.

### **Publicity:**

Report on *Krishi mela* was published in “The New Indian Express” Bhubaneswar edition dated 4<sup>th</sup> March 2005 and in other local dailies. It was also reported in ETV Oriya News and Doordarshan, Bhubaneswar.

The live I.P.M. technology was demonstrated at the Annual District Fair “*Kalahandi Utsav*” from 14<sup>th</sup> to 17<sup>th</sup> January 2005.

### **CICR, Nagpur**

Villages from cotton growing area of Warora taluka from Chandrapur district have been extensively surveyed for the selection of villages to implement the Cotton Front Line Demonstrations Programme. Selection of villages and implementation of FLD programme was discussed with the personnel of State Agricultural Department. Farmers from three villages namely Umari, Tumgaon and Rampur in Warora taluka of Chandrapur District have been selected with the help of State Agricultural Department for implementing cotton Front Line Demonstration Programme during the crop season 2004-05. Initially, preliminary survey of these villages was carried out. Cotton, soybean, sorghum, pigeon pea, chickpea and wheat are the commonly cultivated crop of these villages. Cotton is the main crop and occupies around 60 – 65 per cent of the cultivated area. This was followed by soybean (25 – 30 per cent) and other crops (10 – 15 per cent). Around 50 – 60 per cent soils are shallow and remaining 30 – 40 per cent soils belonged to medium deep to deep soil category.

Cotton hybrid NHH 44 is prominently used by farmers for cultivation in this area. Farmers usually practice 0-6 sprays of commonly used insecticides as per the instructions of the pesticide dealers without knowing the type of pests and its incidence. Around 70 per cent farmers belonged to low income group category. The average cost of cultivation varied from Rs. 4000 – 6000 /ha based on economic condition of the farmers. Majority of the farmers are not aware about the improved technologies of cotton based production system for getting the higher returns with minimum input. This may be one of the reason for low production of cotton yield. Depending upon the weather during the crop season and incidences of insect pest and diseases, the average production of seed cotton yield varied between 4 – 6 quintals /ha.

Hybrid NHH 44 is popular in this area and being tolerant to sucking pests, the cotton seed of hybrid NHH 44 was supplied to the farmers. In addition, the seed of soybean JS 335 for inter cropping, *Rizobium* for soybean and *azotobacter* and PSB for cotton as bio-fertilizer, Suphala as basal dose of nutrient, Urea for top dressing and DAP for foliar application were provided to the farmers. The pesticides were also provided for protecting the crop from the damage of insect pest and diseases.

During the crop season 2004-05, the onset of monsoon was normal. However, the rainfall distribution was not satisfactory in this area. Continuous rains during July and August with more number of rainy days hampered the intercultural operations resulting in suppression of cotton growth. Intercultural operations and 2-3 times hand weeding helped in management of weeds. The farmers were advised to drain out the excess stagnated water from their fields and also advised to maintain the crop free from weed by regular intercultural operations as well as hand weeding. The scanty rainfall and a prolonged dry spell from 7<sup>th</sup> October - December, 2004 during the boll development stage affected the crop growth. This has resulted in reduction of seed cotton yield.

The following technologies have been demonstrated during the current crop season by involving 50 selected farmers from these villages.

1. Integrated nutrient management in cotton
2. Cotton based inter - cropping (cotton + soybean)
3. Integrated pest management in cotton
4. Foliar application of DAP and detopping for yield improvement.
5. Opening of ridges and furrows for moisture conservation.
6. Varietal trial of Surabhi (*G. hirsutum*).
7. Varietal trial of MB 120 (*G. hirsutum*).

The pre-monsoon rains received during the second and third week of May and first week of June 2004 helped the farmers for the early preparation of fields. Around 70% of the sowing was over during 14<sup>th</sup>-15<sup>th</sup> June. The early outbreak of the monsoon initiated the advancement of sowing plan. Dry spell for a period of 10 days during third and fourth week of June affected the germination of cotton and soybean crops sown after 15<sup>th</sup> June. Few farmers have attempted re-sowing due to poor germination. The continuous rainfall, number of rainy days and cloudy weather during July and August was responsible for poor crop growth. However, rains received on 12<sup>th</sup> November in these adopted villages helped improvement of crop growth and seed cotton yield.

Sucking pest at early stage of crop growth and bollworms during boll developments stage are the main biotic yield limiting factors. Incidence of jassids, aphids and thrips were observed during the early stage of the crop growth. Severity of jassids was more as compared to other sucking pests. Among bollworms, low incidence of *Earias* was observed. Where as, the occurrence of *Heliothis armigera* was low to moderate. *H. armigera* population delined from the cotton crop since the first fortnight of October. Pink bollworm damage was observed during the months of November and December. Higher incidence of pink bollworm was observed on variety Surabhi.

The incidence of bacterial blight was observed during the month of August and September. From the month of October, the incidence of bacterial blight was declined. Cloudy weather, intermittent rains in October and night cooling favoured the initiation and development of Grey mildew to a moderate range.

A total of fifty Frontline Demonstrations (FLD) were conducted in these adopted villages. Forty demonstrations on NHH 44 with the recent technologies for cotton improvement viz. Integrate Nutrient Management, Cotton base inter - cropping system (cotton + soybean), Integrated Pest Management in cotton, Foliar application of DAP and detopping for yield improvement and opening of ridges and furrows for moisture conservation have been demonstrated in comparison with the conventional farmers' practice of crop production. Five Front Line Demonstrations were conducted with the recently released variety MB 120 and five with a popular variety Surabhi released for Southern cotton growing areas in comparison with variety Anjali. Integrated nutrient management was demonstrated with the reduced dose of fertilizer supplemented with the use of bio fertilizers in comparison with farmers practice of lower dose of fertilizers. The average seed cotton yield of 997 kg was registered with INM practice as against the farmers' practice of 834 kg/ha under rainfed condition. The per cent increase in seed cotton yield ranged from 15.38 - 23.53 with an average increase of 19.54 per cent seed cotton yield.

Twelve demonstrations were conducted on inter-cropping of soybean with hybrid NHH 44 under rainfed conditions in comparison with sole cotton crop as well as sole soybean crop. An increase of profitability of 21.76 per cent was observed by adopting intercropping of soybean in cotton over sole cotton crop. On an average, additional monetary return of Rs. 5250/ha has been obtained by adopting intercropping of soybean in cotton over sole crop of cotton.

Ten demonstrations were conducted on IPM technology with the use of sucking pest tolerant hybrid NHH 44, trap crops, release of trichoparasitoids, pheromone traps and need based application of selective insecticides/fungicides. In NHH 44 hybrid cotton, the IPM components were quite effective in checking the insect pests and disease incidence. With the application of complete module of Integrated Pest Management, an increase in seed cotton yield ranged between 5.86 - 26.67 per cent with an average increase in seed cotton yield of 14.46 per cent as compared to sole dependence on insecticides.

Six demonstrations were conducted with spraying of 2.0 per cent DAP as foliar application and detopping at 80-90 days old for improvement of seed cotton yield in comparison with farmers practice without spraying of nutrient and without detopping as control (check). The foliar application of 2.0 per cent DAP and detopping at 80-90 days of crop has increased the seed cotton yield up to 979 kg/ha compared to farmers practice of 863 kg/ha. The increase in seed cotton yield was to an extent of 13.44 per cent.

Four demonstrations were conducted by opening ridges and furrows at first inter cultural operation and subsequently maintained them for soil moisture conservation in comparison with farmers practice without opening of ridges and furrows. The opening of ridges and furrows increased the seed cotton yield up to 9.73 per cent as compared with farmers practice of without following ridges and furrows.

Five Front Line Demonstrations for popularizing newly released cotton variety MB120 were conducted on farmers fields to test the yield potential in comparison with variety Anjali. Since, MB 120 is a short duration variety and dry spell during the boll development stage resulted an average reduction of 3.50 per cent seed cotton yield as compared to Anjali.

Five Front Line Demonstrations were conducted to test the yield potential of variety Surabhi popular in Southern cotton growing areas in comparison with variety Anjali. The average seed cotton yield of Surabhi ranged between 625-1125 kg/ha with an average seed cotton yield of 870 kg/ha. On an average, 10.83 per cent increase in seed cotton yield ranging between - 2.22 to 20.00 per cent was obtained as compared with the variety Anjali.

### **Farmers reactions**

1. Farmers have expressed satisfaction in judicious use of fertilizers along with biofertilizers for improvement of seed cotton yield.
2. Farmers were convinced that single way cross hoeing and proper growth of soybean as intercrop suppressed the weeds and improve the soil health.
3. Reduced number of need based sprays under the IPM module could help the farmers to minimize the expenditure on management of insect pest and diseases for higher returns.
4. Farmers have shown keen interest in foliar spray of 2% DAP and detopping at 8090 days crop which improves the seed cotton yield by increasing the boll size and more fruiting points.
5. Opening of ridges and furrows helps in moisture conservation which improve the seed cotton yield. However, the farmers express the difficulties in maintaining ridges and furrows during continuous and heavy rains in July and August.
6. Surabhi has performed well as compared to Anjali. Higher incidence of pink bollworm was the concern of the farmers about its susceptibility to pink boll worm.

### **Extension activities**

Two training programmes on "Integrated pest management in cotton" and "use of cotton based inter-cropping with soybean for higher returns" were conducted at village Tumgaon. Around 60 farmers have participated for each training programmes.

The Krishi Mela was organized on 22-1-2005 at village Tumgaon and around 400 farmers have participated in the programme. Dr. P. Singh, Director, CICR, Nagpur was the chairman, Shri S.S Sakhare, Agricultural Officer also participated in the programme

## **SOUTH ZONE**

### **A GRAD, Guntur**

A total of forty FLDs in cotton were conducted by A.N.G.R. Agricultural University in A.P during the year 2004-05. Of them, 25 in Guntur District by RARS, Lam and 15 in Kumool district by RARS, Nandyal were organized.

### **FLDs in Guntur District (RARS, Lam):**

A total of 25 FLDs (7 with INM and 18 Bt. Hybrids vs. non Bt. Varieties) on cotton production technologies were organized in as many as 11 villages in Guntur district. The sowings were done in the month of July, 2004. The following cotton production technologies ere



adopted in the FLDs.

### **Technologies adopted**

The following two technologies were demonstrated in FLDs

- Integrated Nutrient Management in cotton with intercropping of Black gram Vs Farmers method.
- *G. hirsutum* varieties of cotton Vs *intra hirsutum* Bt hybrids.

### **Season and crop condition:**

A total rainfall of 685.5mm in 44 rainy days was received as against the decennial average of 910.9mm in 46 rainy days. The cotton crop was sown in July, 2004. A dry spell prevailed for about one month after sowing. In September, there was sufficient rainfall. However the monsoon ceased by the first week of October 2004. The precipitation during this year was 23 % less than the average.

The incidence of American boll worm was comparatively lesser during this year. There was sporadic appearance of Spodoptera in the month of October. The pink boll worm damage was observed from October and its effect was felt severely in late season on non Bt cotton. The disease incidence particularly leaf spots (*Cercospora*, *Alternaria*, *Helimentosporium*) was found after August rains. However, necessary plant protection measures were taken by farmers and normal yields were obtained.

### **Progress and result of FLDs**

#### **FLDs on Integrated Nutrient management**

A total of 7 demonstrations with Integrated Nutrient Management technology were organized in three villages Jonnalagadda, Gudipudi and Ponnekallu of the Guntur district. with local cotton hybrid (Bunny). The technology of INM involved in the FLD plots was application of 15 cart load FYMha<sup>-1</sup> and application of 120-60-60 NPK ha<sup>-1</sup>, foliar spray of Boron 0.15% (twice at 75 & 90 DAS) , MgSO 4 1.0% + 2% DAP foliar spray ( at squaring) as against control plots (farmers method). All other management practices were followed as per the recommendation of the region. The farmers' method of cultivation was taken as control.

All the demonstrations exhibited the advantage of INM in cotton. An increased boll size and also number were observed in INM plots. Micro nutrient deficiency of Boron was not seen in INM plots. The crop was vigorous and drought tolerance compared to control plots. The results of the demonstrations indicated that average increase in seed cotton yield in INM adopted plots was 228 kg /ha (9.70 %) with net return of Rs 2645/- and BCR 0.7 over the non INM plots

## **FLDs on Straight varieties vs. Hirsutum Bt Hybrids:**

A total of 18 demonstrations were conducted with this technology. Bt. Hybrids vs. non Bt. Straight varieties viz., L-761, L-788 were demonstrated in these plots. The villages were Medikondur, Edlapadu and Lingaraopalem and Surabhi in Medikondur, Gudipudi, Vinjanampadu, Edlapadu and Nimmagaddavaripalem, Lam, Jangamguntiapalem, Balusupadu and Ananthavarappadu villages of Guntur district. Sowing was done in the months of July and package of the practices were followed as per the recommendation for hirsutum cotton varieties. Ten rounds of pesticide sprays were used on non Bt. Straight varieties where as only six sprays of pesticide sprays were used in Bt cotton hybrids plots. The Bt hybrid RCH-2Bt grown by the farmers in all the 18 demonstrations out yielded the hirsutum varieties demonstrated. The seed cotton yield (3660 kg/ha) recorded with the RCH -2Bt. hybrid was much higher than that of non Bt. varieties L-761 (2020 kg/ha) and L-788 (2000 kg/ha). The higher seed cotton yield obtained with the hybrids is due to the early setting of bolls and negligible incidence of Helicoverpa and pink boll worm. Lower yields were recorded with non Bt. varieties due to incidence of Heliothis at squaring and flowering stages and also pink boll worm at later stages. Clean kapas with undamaged locks was obtained from B t cotton hybrids.

Among the cultivars tested, RCH-2 Bt was found superior over straight varieties of cotton tested L-761, L-788 and Surabhi. The performance of Surabhi was very poor in yield compared to the other hybrids and varieties. Farmers opined that the performance; of Bt. hybrid (RCH-2Bt.) was very good and that of Surabhi is very poor. But as per the' fibre qualities especially for fibre length Surabhi variety was found to be better. Farmers opined that straight varieties with Bt gene is required in place of Bt hybrids in cotton as the price of Bt. Hybrid seed is costly.

**Training Programmes organized on** Integrated Nutrient Management, G. *hirsutum* varieties of cotton Vs Bt hybrids and Inter cropping Black gram in cotton at Gudipudi, Edlapadu, Vinjanampadu and Medikonduru

## **FLDs IN KURNOOL District (RARS, NANDYAL)**

During the year 2004-05, fifteen Frontline Demonstrations in cotton were organized by AICCIP sub-centre, RARS, Nandyal at Balapanur (7), Kandulapuram (3), Akaveedu (2), Araveetikota (2) and Nadimpalli (1) villages of Panyam, Cumbum and Racherla mandals during the year 2004-2005.

## **Progress of Demonstrations**

The FLD farmers who cultivated Narasimha cotton variety with improved technology realized higher net income than non-FLD farmers. The FLD farmers who cultivated Aravinda cotton variety with improved technology realized higher net income than non-FLD farmers who cultivated local variety Pandari Mungari.

## **Kisan Mela**

Kisan Mela was organized at Kandulapuram village, Cumbum mandal on 2<sup>nd</sup> March 2005. The 'Scientists-farmers' interaction meeting was also arranged which enabled the farmers to get their field problems and doubts cleared. A total of 250 farmers attended the meeting.

## **UAS, Dharwad**

Forty front line demonstrations (FLDs) were conducted with newer hybrids/varieties viz., DHH-543, DHB-290, RCH-2Bt, MECH-162 and DLSa-17 in different districts of Dharwad, Raichur, Bellary and Gulberga, respectively in different agro climatic regions coming under purview of University of Agricultural Sciences, Dharwad. Recent agricultural technologies developed on new varieties/hybrids, IPM, INM, water management have been demonstrated in comparison with the conventional methods of crop production under the supervision of UAS scientists. The selected farmers served as lead farmers to guide other farmers in the neighbouring areas for quicker adoption of the improved technologies. The front line demonstrations were successful in exhibiting and disseminating the improved significant techniques to the farming community. Front line demonstration programme served as yardstick for other farmers to raise good cotton crop.

### **Results of Front line demonstrations:**

#### **a) Demonstration on popularization of newly released hybrids/varieties**

DHH-543 cotton hybrid from 6 locations showed its superiority over DHH-11 by registering higher seed cotton yield to an extent of 14.3 per cent. DHB-290, interspecific hybrid in 3 locations, performed better over DHB-1 05 cotton hybrid with an increased yield of 8.54 per cent. Demonstration on RCH-2 Bt compared with DHH-112 Bt cotton hybrid has recorded highest seed cotton yield of 19.25 q/ha as compared to check (13.87q/ha) hybrid. The yield advantage under RCH-2 Bt was to an extent of 38.78% over its check. Similarly, MECH-162 Bt was also compared with NHH-44 in 2 locations, clearly showed its superiority by registering higher seed cotton yield to an extent of 127%. MECH-162 Bt has recorded 29.025 q/ha seed cotton yield in comparison to NHH-44 with 12.78 q/ha. Performance of desi variety DLSa-17 in 1 location recorded highest seed cotton yield (10.50q/ha) over Jayadhar variety (7.87 q/ha).

#### **b) Demonstration on Integrated Pest Management:**

Front line demonstration on IPM technology with varied components undertaken in 3 locations resulted in more economic benefits and higher seed cotton yield (20.70 q/ha) as compared to non IPM components (15.76 q/ha). The overall increase in yield was to extent of 31.34%. IPM with AAFI in 2 locations performed better with 19.95 q/ha more seed cotton yield over the farmers practice (15.60 q/ha). Increase in the seed cotton yield was to an extent of 227.88%. Similarly, IPM technology with integrated nutrient management (INM) in 1 location has recorded highest seed cotton yield of 24.5 q/ha as compared to farmers practice (16.50 q/ha). The yield advantage under IPM with INM technology was 48.48% over farmers' practice.

Integrated Nutrient Management (INM) technology was demonstrated in 1 location in comparison to application of only RDF (Recommended Dose of Fertilizer). The highest seed cotton yield of 19.95 *q/ha* was registered with INM practices as against farmers' practice (16.05 *q/ha*).

Boll rotting in hybrid cotton under high rainfall situations is a major problem, which results in considerable yield loss. To overcome this problem, spraying of Chloritonal @2g/l was given at boll formation and after first picking stage. Two rounds of sprays (Chloritonal @2g/l) for boll rot resulted in 5.60% yield advantage over check.

In one location alternated furrow irrigation and INM practices performed much better (7.25 *q/ha*) as compared to farmers practice (6.50 *q/ha*), with a yield advantage of 11.53%.

There was an overall saving of about 36.0% of applied irrigation water by adopting AAPI in cotton over API and no significant difference was observed in Kapas yield obtained in both the plots.

### **Cotton Field Day Report:**

Field day on "Cotton- IPM Programme" was conducted on 20-10-2004 at Hadagali in the field of Sri. Anni Veeranna S/o Chandrappa.

### **TNAU, Coimbatore Aruppukottai Sub centre**

#### **i) Demonstration of the yield potential of the new varieties over the old varieties.**

The demonstrations were organised to popularize the high yielding and desirable quality possessing *G. arboreum* variety Jawahar Tapti among the rainfed cotton growing farmers of Virudhunagar district. Nineteen FLDs each covering in a total area of one hectare with the varieties *viz.* Jawahar Tapti (improved variety) and K11 (ruling Check) in equal area were conducted in different Blocks of farmers holdings at Virudhunagar district under complete rain fed condition. The ancillary yield contributing character *viz.* boll number and seed cotton yield were recorded. Lint samples are being sent for quality characters evaluation both in Jawahar Tapti and K11 and results awaited.

#### **ii) Popularization of improved agronomic practices for yield maximization**

The following improved agronomic practices were advised to farmers for adoption.

- Coarse tilth preparation
- Resorting to pre monsoon sowing
- Seed treatments with fungicides Carbendazim @ 2 gm/kg of seeds or Trichoderma viridae @ 4gm/kg of seeds
- Bio - fertilizer application -2 kg Azospirillum / ha
- Application of recommended dosage of inorganic fertilizer @ 40: 20: 0 NPK Kg/ ha
- Application of either enriched farmyard manure @ 750 kg/ha or farm yard manure @

12.5 t/ha.

- Line sowing along broad bed furrows or in compartment bunds @ 45 x 15 cm
- Pre emergence application of herbicides like fluchloralin @ 2.2 litres/ha or pendimethalin 3.3 litres/ha followed by one hand weeding on 35 - 40th day after sowing.
- Application of 12.5 kg of micronutrient mixture after mixing in 37.5 kg of sand
- Intercultivation with blade harrow on 30th and 45th day.
- Nipping the top at 90,120 and 150 days to arrest terminal growth.

### **iii) Demonstration of the IPM technologies for effective pest and disease management**

- Seed treatment with Imidocloprid (5g/kg of seed) to protect the crop up to 40<sup>th</sup> to 50<sup>th</sup> days against sucking pests and also to avoid or reduce the early season insecticide application and thus to conserve the beneficials.
- Growing Cowpea as "bund crop" to sustain and enhance the build up of natural enemies
- Insertion of Bhendi as a trap crop for diversion of Helicoverpa oviposition from main cotton crop.
- Removal of terminals after 90<sup>th</sup> day to reduce Helicoverpa oviposition
- Hand picking of grown up larvae for resistance development and to minimise insect population build up
- Application of plant products viz. neem seed kernal extract 5% spray for oviposition g avoidance
- Placement of pheromone traps (5/ha) after 45<sup>th</sup> day to monitor and assess Helicoverpa population in the field

### **Disease management**

- Seed treatment with Trichoderma viridae (4g/kg of seed) and Pseudomonas fluorescense (10grn/kg) to reduce root rot and wilt incidences.
- In few locations, bacterial blight was observed with the scale ranging from 1 - 2. The further spread of this disease was prevented by application of Streptomycin sulphate + Tetracycline mixture - 100 gms + Copper oxy chloride @ 2kg / ha

### **iv) Popularization of the concept of Seed village to new areas.**

The FLD trials were well distributed by covering various blocks of Virudhunagar district. The people learnt the better performance and desirable attributes of newly introduced G. *arborreum* variety Jawahar Tapti through spot demonstrations. The advantage of reuse of the seed of this variety unlike hybrid seeds was suggested. Hence it was advocated to the farmers to keep the seeds of this elite variety for subsequent sowing in larger area future.

**Results:** The details of the location of demonstration plot, name and address of the farmer, date of sowing, cotton varieties used, boll numbers count, seed cotton yield and percentage of increase over local check are given below.

The farmers of this tract grow cotton under completely rainfed condition besides their adoption of time memorial mixed cropping. It could not become possible to transfer all the technologies in all FLD conducted farmers and entire farming community. However, the important improved agronomic practices coupled with integrated pest management strategies highlighted above were adapted to the extent possible by farmers through Front Line Demonstrations.

The mean number of bolls-per plant ranged from 9.9 to 14.8 in Jawahar Tapti and from 9.1 to 13.6 in K11. The seed cotton yield ranged from 148 kg/ha to 350/kg ha in Jawahar Tapti while from 129kg/ha to 300 kg/ha in K11.

The overall performance revealed that Jawahar Tapti was the best performer by recording the yield of 202kg/ha as against the check K11 with 177.3kg/ha. Jawahar Tapti has recorded 13.9% increased yield as against the check K11 on overall basis.

### **FARMERS' OPINION**

The farmers are very much impressed with the performance of *G. arboreum* cotton variety Jawahar Tapti as it gave increased yield over control variety K11 in all demonstrations. The farmers have also appreciated the adoption of improved agronomic practices as the ways and means to enhance the yield and integrated pest management measures for the control of pests.

### **Agricultural Research Station, Kovilpatti**

Nineteen number of one hectare farmers field demonstrations were arranged to demonstrate the high yielding potential of new long linted *arboreum* variety of cotton Jawahar Tapti (developed at JNKVV, Khandwa) compared with locally adopted Karunganni cotton variety K11 (developed at Agricultural Research Station, Kovilpatti, TNAU). Each 0.5 hectare demonstration of two varieties at every farmer's field was assigned. All the production technologies were adopted as per the package of practices mentioned in the T crop production manual via: summer ploughing, sowing in lines, application of recommended dose of fertilizers, timely weeding, adoption of integrated pest management etc.,

### **Locations of demonstration:**

The nineteen front line demonstrations were with Jawahar Tapti and K 11 cotton, that were well distributed at Tuticorin and Tirunelveli districts. Tuticorin district comprised of fifteen FLDs belonging to Kovilpatti and Ettayapuram taluks and four FLDs belongs to Sankarankovil taluk of Tirunelveli district. All these FLDs are under black soil with low rainfall area. The cotton cultivation are purely under rainfed conditions. The seed cotton yield of all the FLDs were recorded in both Jawahar Tapti and K 11 varieties. Among the 19 FLDs, the new variety Jawahar Tapti performed well under 15 FLDs and it recorded average yield of 492 kg/ha, which was 10.66 % increased yield over K II (445 kg/ha) in overall performance. In another 4 FLDs it was observed that K 11 had 5% higher yield than Jawahar Tapti. The maximum yield of Jawahar Tapti (563 kg/ha) and K11 (540 kg/ha) was observed in Karungalipatti village and Kumaragiri of Kovilpatti taluk, respectively.

## **FARMERS' OPINION:**

The farmers are very much interested in raising new variety Jawahar Tapti not only because of higher seed cotton yield, high quality, drought tolerance and also fetches higher price on par with Cambodia cotton. Under black soil condition, the variety Jawahar Tapti performed well even under lesser/erratic rainfall during this year.

## **FIELD DAY (KRISHI MELA - VAYAL VIZHA) :**

In view of success of FLDs, the cotton field day (Krishi mela) was celebrated at Agricultural Research Station, Kovilpatti on 01.03.2005. More than 450 farmers participated in this function. Dr.K.Subbiah, Professor and Head, Agricultural Research Station, Kovilpatti welcomed the gathering. Dr.Sami.Ramanathan, Director of Research, Tamil Nadu Agricultural University, presided over the function. Mr. V.Chandrasekaran, I.A.S, District Collector, Tuticorin delivered speech and distributed prizes. Dr.K.Duraisamy, Director of Extension Education, Tamil Nadu Agricultural University, Dr.N.Kembuchetty, Dean, AC&RI, Madurai, Mr.A.Dhanushkodi , B.Sc.(Agri.), Joint Director of Agriculture, Tirunelveli and Mr.Durai Selvaraj, IBPS, Director of All India Radio, Tirunelveli gave special lectures to farmers regarding importance and objectives of FLDs. Benefited farmers shared their experiences of FLD cotton cultivation and success stories. The scientists and farmers interactions were held and farmers' doubts had been cleared by our scientists. Dr.N.Muppidathi, Professor (PB&G) who is in charge of this scheme delivered a lecture on "Special features of high yielding cotton varieties" and delivered vote of thanks to the gatherings.

## **COTTON RESEARCH STATION, SRIVILLIPUTTUR**

### **A.Summer irrigated - Interventions instituted in FLDs**

#### **i. INM - Skipping basal**

Variety Locations : SVPR 2Four villages namely Mamsapuram, Chittalamputtur, Kadambangulam and Malliputtur

#### **i. FLD on chemical control of stem weevil**

Scientists of Cotton Research Station, Srivilliputtur were assigned to demonstrate and to give training on the improved technology to FLD farmers

### **Tamil Nadu Agricultural University, Coimbatore**

The demonstrations were organized to demonstrate the potential and to popularize the high yielding variety MCU 12 among the farmers. For that fifteen demonstrations were arranged to demonstrate the high yielding potential of new variety MCU 12 in the farmers holding at Kanchampalli and Nariyampallipudur village in Annur, Coimbatore District. All the production technologies mentioned in the crop production manual were adopted as compared to farmers' method of adoption.

## **Technologies Demonstrated**

To demonstrate the high yielding potential of the new varieties, to popularize the production technologies for yield maximization in cotton, to demonstrate the IPM technologies for effective pest management and to popularize the concept of "Seed Village" to new areas.

## **Location of the Demonstration**

Among the fifteen front line demonstrations to demonstrate high yielding potential of the new variety over old varieties, thirteen were laid out with MCU 12 and one each with MCU 13 and Bt cotton hybrid MECH 162 Bt. Among fifteen demonstrations, two demonstrations were laid out under organic farming concept without use of chemical fertilizers and pesticides.

## **Season and Crop Condition**

In early stage, crop condition was good in both the blocks. Later during the period of boll maturation stage, the boll retention was poor in Annur Mettupalayam block due to continuous rainfall for 35 - 40 days. Hence square shedding was noticed and the second formed flush has formed into bolls and yield recorded was low. Due to adoption of Integrated Pest Management measures in the demonstration plots, the bollworm and other insect damage was controlled with three to four sprayings as compared to six to eight sprayings by the farmers in the controlled plot.

## **Farmers Opinion on Front Line Demonstrations**

The farmers are very much impressed with the MCU 12 cotton because of its higher yield than local varieties tried by the farmers. They also inferred that MCU 12 is better in fibre quality when compared to local varieties PKV Rajat and LRA 5166. The farmers Thiru.Y. Mayilsamy Gounder was impressed with the yield recorded by him in MCU 12 plot which was grown organically where only one spray of neem based pesticide was applied.

## **Trainings**

The FLD farmers have attended the one day workshop on "Biosafety issues related to Bt cotton" organized at Tamil Nadu Agricultural University and M/s.Biotech Consortium India Limited on 05.03.2005.

Training for cotton growers was organised at Annur in which Dr.A.Ramalingam, Professor and Head and Dr.N.Meyyazhagan, Professor (Agronomy) have participated and imparted training to the FLD farmers.



## IMPLEMENT DEMONSTRATION

### HAU, Hisar

Under cotton Frontline Demonstration Programme of ICAR, the following implements were purchased for demonstration at farmers' field in Sirsa and Hisar Distt. During 2005-2006 season.

| S.No | Name of implement No.  | Qty. | Remarks                       |
|------|--|------|-------------------------------|
| 1    | Rotavator for interculture in standing cotton crop                                       | One  | For Hisar                     |
| 2    | Sub soil for deep ploughing  | Two  | One for Hisar & one for Sirsa |
| 3    | Seed cum fertilizer Drill for cotton hybrid and variety seed sowing.                     | Two  | -do-                          |
| 4    | Bar-Harrow for interculture in standing cotton crop                                      | Two  | -do-                          |
| 5    | Spray pump with 1500 litre tank capacity fitted with A SPEE pump and moist type nozzles. | Two  | -do-                          |

### TNAU, Coimbatore

The following implements were fabricated and purchased utilizing the funds allotted from the Zonal Research Centre, AEC & RI, Tamil Nadu Agricultural University.

1. Tractor drawn ridger seeder
2. tractor operated roto slasher
3. Self propelled power weeder with earthing up attachment
4. Tractor operated rotary weeder

With the help from the Department of Farm Machinery, two FLDs were organized one each in Aruppukottai and Srivilliputhur on roto slasher and tractor drawn ridger cum seeder.

**Expenditure details on FLD and Implement Demonstration conducted 2004-05**

| Allocation Rs.                   | Funds received from the Council Rs. | Centres             | Expenditure (Rs.) Amount Disbursed (Rs.) FLD | Implement Demonstration |
|----------------------------------|-------------------------------------|---------------------|--|-------------------------|
| <b>Front line Demonstrations</b> |                                     | PAU, Faridkot       | 3,54,000                                     | 2,50,000                |
| 45,00,000                        | 45,00,000                           | CCSHAU, Hisar       | 3,54,000                                     | 2,50,000                |
|                                  |                                     | RAU, Sriganaganagar | 94,400                                       | 2,50,000                |
|                                  |                                     | MPUAT, Banswara     | 1,18,000                                     | 2,50,000                |
|                                  |                                     | CSAUAT, Kanpur      | 33,040                                       | 2,30,000                |
|                                  |                                     | CICR, Sirsa         | 1,41,600                                     | 2,30,000                |
|                                  |                                     | GAU, Surat          | 2,36,000                                     | 2,00,000                |
|                                  |                                     | JNKVV, Khandwa      | 5,90,000                                     | 2,30,000                |
|                                  |                                     | Dr.PDKV, Akola      | 2,36,000                                     | 2,00,000                |
| <b>Implement Demonstration</b>   |                                     | MAU, Nanded         | 3,30,400                                     | 2,30,000                |
| 55,00,000                        | 34,80,000                           | MPKV, Rahuri        | 2,36,000                                     | 2,00,000                |
|                                  |                                     | OUAT, Bhavanipatna  | 4,72,000                                     | 2,00,000                |
|                                  |                                     | CICR, Nagpur        | 2,36,000                                     | 2,00,000                |
|                                  |                                     | ANGRAU, Guntur      | 1,88,800                                     | 2,30,000                |
|                                  |                                     | UAS, Dharwad        | 1,88,800                                     | 2,30,000                |
|                                  |                                     | TNAU, Coimbatore    | 2,97,360                                     | 2,00,000                |
|                                  |                                     | PC's Cell           | 2,52,000                                     |                         |
|                                  |                                     | <b>Total</b>        | <b>45,00,000</b>                             | <b>34,80,000</b>        |

**BUDGET ABSTRACT 2004-05**

| Details  | Amount in Rs.    |
|--|------------------|
| <b>Front Line Demonstrations</b>               |                  |
| Amount Sanctioned                              | <b>45,00,000</b> |
| Amount Received from the Council               | 45,00,000        |
| Amount Disbursed                               | <b>45,00,000</b> |
| Balance Amount to be received from the Council | Nil              |
| <b>Implement Demonstrations</b>                |                  |
| Amount Sanctioned                              | <b>55,00,000</b> |
| Amount Received from the Council               | 34,80,000        |
| Amount Disbursed                               | <b>34,80,000</b> |
| Balance Amount to be received from the Council | 20,20,000        |