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| <b>TMC MM I.4 :</b> | <b>Evaluation of genotypes and standardization of agrotechniques for high density planting and surgical cotton production</b> |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------|

|                            |                                                                                                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Lead Centre :</b>       | CICR, Nagpur                                                                                                                                                                                        |
| <b>Cooperating centres</b> | CICR,Coimbatore; CICR,Sirsa; PDKV, Akola; MAU, Nanded; UAS Dharwad; PAU, Faridkot; CRIDA, Hyderabad; MPKV, Jalgaon; HAU, Hisar; CIRCOT, Mumbai; KVKs/Ramakrishna Bajaj Krishi Mahavidyalaya, Wardha |

## Introduction

### High density planting system

Increase of plant density with decreasing cotton row spacing has been suggested as an alternative strategy to optimize cotton productivity, reduce production costs and increase profit. Availability of more suitable cultivars, more efficient options of weed control and insect pest management (including transgenics), growth regulators to modify morpho-frame, planting and harvesting equipments has rekindled an interest in high density cotton planting. The optimum plant density under parabolic relationship will depend upon the genotype characteristics, properties of soil, climatic parameters and management regime. The productivity of rainfed cotton in vertisols and vertic intergrades in different AESRs of Central India and southern peninsula remains low despite the widespread adoption of Bt hybrids. The earliness associated with high density planting makes this system suitable for rainfed vertisols and vertic intergrades where the cotton crop invariably experiences terminal moisture stress. On such soils, High Density Planting System (HDPS) with short duration, compact varieties is an alternate approach for improving cotton productivity. Several R&D issues need to be redressed before this technology can be commercially adopted. It is envisaged that HDPS would emerge as a boon to farmers particularly those cultivating cotton on marginal soils.

### Surgical cotton varieties

Till 2005 years ago, India had about 20 lakh hectares were under desi cotton in India. Now, it has been reduced to less than 1 lakh hectare due to large scale adoption of Bt hybrids even in the conventional desi cotton tracts. The demand surgical and absorbent cotton



is growing at the rate of 10 percent per annum across the world. Ideally surgical cotton requires coarse textured texture (micronaire 6.0-6.5) lint with short fibre length of approximately 17-18mm so that these can easily be arranged into layers for surgical use. Desi cotton (*G. arboreum*) cultivated widely in the past ideally was ideal for this purpose. Decline in the availability of desi cotton in this quality bracket has hit the surgical cotton industry hard and manufacturers are looking to comber noil which is an inferior substitute to bridge the gap. Desi cotton grown and processed in organic/eco-friendly route has a huge export potential in the European market. The project intends to identify genotypes and appropriate technology to make desi cotton production more profitable and thereby recapture the area under desi cotton partnering with farmers and absorbent cotton manufacturers by promoting desi cotton for surgical and absorbent use.

### Objectives

- To identify early maturing, suitable compact *G. hirsutum* genotypes for high density planting and *G. arboreum* genotypes for surgical cotton production
- To evaluate promising cotton genotypes of at high population densities with appropriate crop geometry in different AESRs on shallow to medium soils for HDPS (*G. hirsutum*) and medium to deep soils for surgical cotton (*G. arboreum*)
- To standardize production and protection technologies (including mechanization options) to maximize cotton productivity under high density planting and for surgical cotton production systems
- To standardize and demonstrate a cost effective microbial and enzymatic pathway for surgical cotton processing
- To conduct large scale demonstrations and perform economic analysis of HDPS technology



## Technical programme

| S.No.                               | Activities                                                                                                            | Cooperating centres                                                                                                                            |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HDPS</b>                         |                                                                                                                       |                                                                                                                                                |
| 1.                                  | Evaluating promising genotypes for optimum plant density and geometry under HDPS                                      | CICR, Nagpur;<br>CICR,Coimbatore;<br>CICR,Sirsa; PDKV,<br>Akola; MAU, Nanded;<br>UAS Dharwad; PAU,<br>Faridkot; CRIDA,<br>Hyderabad            |
| 2.                                  | Standardizing soil moisture conservation measures, nutrient and PGR requirements for cotton under HDPS                | CICR, Nagpur;<br>CICR,Coimbatore;<br>CICR,Sirsa; PDKV,<br>Akola; MAU, Nanded;<br>UAS Dharwad; CRIDA,<br>Hyderabad                              |
| 3.                                  | Standardizing weed management strategies to optimize productivity under HDPS                                          | CICR, Nagpur;<br>CICR,Coimbatore;<br>PDKV, Akola; MAU,<br>Nanded; UAS Dharwad;                                                                 |
| 4.                                  | Formulating and validating insect pest and disease management strategies under HDPS                                   | CICR, Nagpur;<br>CICR,Coimbatore                                                                                                               |
| 5.                                  | Evaluating implements for planting, interculture, spraying and weeding operations in HDPS.                            | CICR, Nagpur;<br>CICR,Coimbatore;<br>PDKV, Akola;                                                                                              |
| 6.                                  | Farmer participatory technological and socio economic evaluation of HDPS                                              | CICR, Nagpur; CICR,Sirsa;<br>CICR,Coimbatore;<br>PDKV, Akola; PAU,<br>Faridkot; MAU, Nanded;<br>UAS Dharwad; CRIDA,<br>Hyderabad; RKBM, Wardha |
| <b>Desi cotton for surgical use</b> |                                                                                                                       |                                                                                                                                                |
| 7.                                  | Evaluating promising genotypes for yield and fibre properties for surgical use                                        | CICR, Nagpur; CICR,Sirsa;<br>PDKV, Akola; UAS Dharwad                                                                                          |
| 8.                                  | Standardizing agronomic and plant protection requirements for the promising genotypes including <i>cernuum</i> cotton | CICR, Nagpur; CICR,Sirsa;<br>PDKV, Akola; UAS Dharwad<br>MPKV, Jalgaon                                                                         |
| 9.                                  | Farmer participatory 'cluster village' approach to cultivate desi cotton in contract-farming mode                     | PDKV, Akola; UAS Dharwad<br>MPKV, Jalgaon;<br>PAU, Faridkot                                                                                    |
| 10.                                 | Assessing the technical feasibility & cost effectiveness of microbial and enzymatic pathways for surgical cotton      | CIRCOT, Mumbai                                                                                                                                 |
| 11.                                 | Augmenting seed production of varieties used for surgical cotton manufacture                                          | CICR, Nagpur; CICR,Sirsa;<br>PDKV, Akola; UAS Dharwad<br>MPKV, Jalgaon; PAU, Faridkot                                                          |

## Time frame

| Sr. No. | Activity                                                                                                         | Time frame |    |         |    |         |    |         |    |         |    |
|---------|------------------------------------------------------------------------------------------------------------------|------------|----|---------|----|---------|----|---------|----|---------|----|
|         |                                                                                                                  | 2012-13    |    | 2013-14 |    | 2014-15 |    | 2015-16 |    | 2016-17 |    |
|         |                                                                                                                  | I          | II | I       | II | I       | II | I       | II | I       | II |
|         | <b>HDPS</b>                                                                                                      |            |    |         |    |         |    |         |    |         |    |
| 1.      | Evaluating promising genotypes for optimum plant density and geometry under HDPS.                                |            |    |         |    |         |    |         |    |         |    |
| 2.      | Standardizing soil moisture conservation measures, nutrient and PGR requirements for cotton under HDPS.          |            |    |         |    |         |    |         |    |         |    |
| 3.      | Standardizing weed management strategies to optimize productivity under HDPS.                                    |            |    |         |    |         |    |         |    |         |    |
| 4.      | Formulating and validating insect pest and disease management strategies under HDPS.                             |            |    |         |    |         |    |         |    |         |    |
| 5.      | Evaluating implements for planting, interculture, spraying and weeding operations in HDPS.                       |            |    |         |    |         |    |         |    |         |    |
| 6.      | Farmer participatory technological and socio economic evaluation of HDPS.                                        |            |    |         |    |         |    |         |    |         |    |
|         | <b>Desi cotton for surgical use</b>                                                                              |            |    |         |    |         |    |         |    |         |    |
| 7.      | Evaluating promising genotypes for yield and fibre properties for surgical use                                   |            |    |         |    |         |    |         |    |         |    |
| 8.      | Standardizing agronomic and plant protection requirements for the promising genotypes including cernuum cotton   |            |    |         |    |         |    |         |    |         |    |
| 9.      | Farmer participatory 'cluster village' approach to cultivate desi cotton in contract-farming mode                |            |    |         |    |         |    |         |    |         |    |
| 10.     | Assessing the technical feasibility & cost effectiveness of microbial and enzymatic pathways for surgical cotton |            |    |         |    |         |    |         |    |         |    |
| 11.     | Augmenting seed production of varieties used for surgical cotton manufacture                                     |            |    |         |    |         |    |         |    |         |    |

## Outputs

- *G hirsutum* genotypes suitable for HDPS and *G arboretum* genotypes for surgical cotton production in different AESRs
- Cotton production and protection technologies (including mechanization options) to maximize cotton productivity under high density planting and for surgical cotton production systems
- Herbicide based weed management and reduced tillage options for HDPS and Dei cotton production
- Mechanization options for small and medium farmers adopting HDPS and desi cotton production
- Production technology for cernuum (Comilla) cotton production on Vertisols of Central India
- Eco-friendly surgical cotton manufacturing technology

