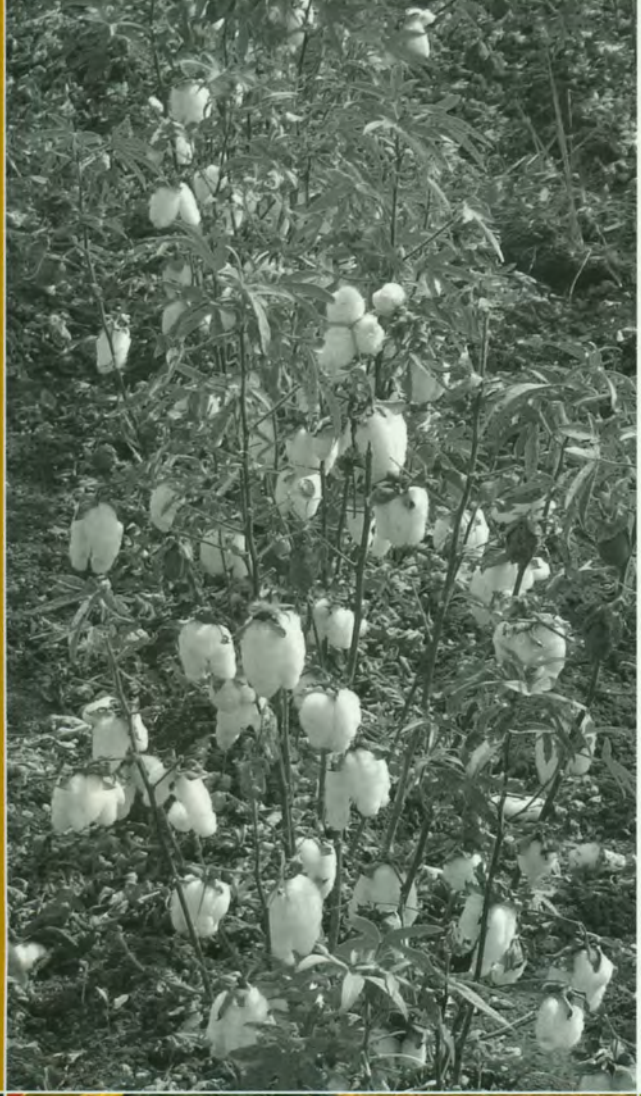

Annual Report
2015-16

भाकृअनुप
ICAR

CENTRAL INSTITUTE FOR
COTTON
RESEARCH, NAGPUR

भा कृअनुप
ICAR

वार्षिक प्रतिवेदन

ANNUAL REPORT

2015-16

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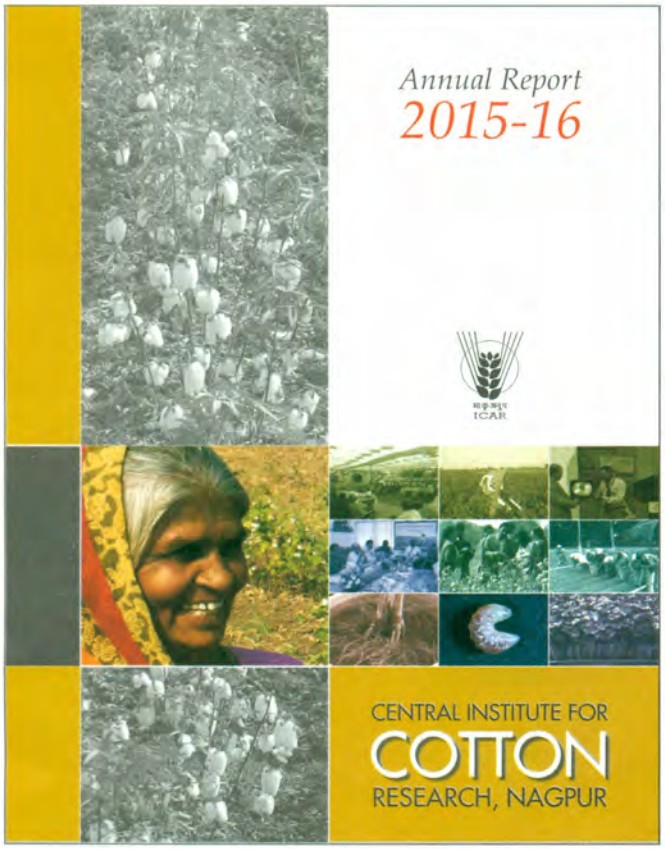
ICAR- CENTRAL INSTITUTE FOR COTTON RESEARCH, NAGPUR



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PREFACE

The year 2015-16 was productive on many counts from R&D perspective. The institute developed several exciting technologies, machinery, cotton varieties, cropping systems, new genes and new concepts. A small scale tractor mounted cotton picking prototype was developed in collaboration with ICAR-CIRCOT and Mahindra Pvt Ltd. The prototype machine was found to be promising. A simple hand held low cost device for instantaneous (10 seconds) detection of nitrogen deficiency in cotton leaves. The device instantaneously provides voice based recommendation of ameliorative measures in vernacular language based on diagnosis. Genotyping data for 2730 SNPs, mapped on 29 linkage groups, were used for QTL mapping. Ten QTLs were identified for staple length, tenacity and micronaire. Marker assisted breeding (MAB) for Bacterial Leaf Blight (BLB) Resistant Suraj using CIR 246 is in the Back-cross-2 (BC-2) stage. SSR markers BNL 3279 and NAU 2152 are being used (BC-1) in MAB for nematode resistance. More than 3000 germplasm accessions were evaluated and several new lines were identified for tolerance to drought, waterlogging, cotton leaf curl virus, whiteflies and leaf hoppers. Cry1Ac based Bt-cotton event Tg2E-13 event was obtained from Delhi University (DU) and first crosses were made with elite varieties. Gossypol detoxifying gene *cyp6ae14* was subcloned in to bacterial expression vector pET28c. Ten genes, ethylene-responsive element binding factor (ERF) 1, 2, 3. Trehalose-6-phosphate synthase (TPS) 1,2,3 Alpha pinene, Lipoxygense 1, Allene oxide synthase 6 and Methyl jasmonate transferase were characterized using real-time (RT) PCR to elucidate their role in systemic acquired resistance in cotton. Inter-specific variation in volatile emission in 3 species of *Gossypium* in response to leaf hopper, caterpillar and mechanical damage was investigated. Pink bollworm infested cotton flowers were found to have higher levels of β Caryophyllene, methyl ester of pentadecanoic acid and linolenic acid, which are precursors of jasmonic. Out of the Bioassays pink bollworm populations of 39 districts, evaluated for resistance to Bt-cotton, populations in 15 districts were confirmed to have developed resistance to Bollgard-II (Cry1Ac+Cry2Ab); 20 populations were resistant to Bollgard (Cry1Ac) and 18 populations were resistant to Cry2Ab. Under high density planting systems, LRK 516, Suraj JT, CNH 1111, CSH 3075, CNH 09-4, CSH 3075, AKA 8, RG-540, CNA375, Phule Dhanwantary, CNA 418, MDLABB and CISA 6 were found to most promising.

Twenty legumes were evaluated as intercrops for compatibility and N fixation. Cluster bean, soybean and groundnut and cowpea were found to enhance benefits of yield and nitrogen fixation. Structured water irrigated plots had higher cotton yield than the bore well irrigated plots. Cotton seedlings raised in paper tube rolls when transplanted in the field established quickly and yielded more than the direct sown cotton.

Last year, two major factors affected yields negatively. Whitefly outbreaks in Punjab and the pink bollworm resistance to Bt-cotton in Gujarat, Karnataka, AP, MP and parts of Maharashtra emerged as serious problems that needed attention. The institute played a stellar role to assist stakeholders in combating the crisis efficiently. Bt-cotton hybrids that were tolerant to whiteflies and the leaf curl virus were identified and the list provided to the concerned Government departments. Regular weekly advisories in 8 languages were issued on the institute web-site to assist farmers throughout the season. Under a programme called E-Kapas, regular voice mail weekly advisories were sent to more than 225,000 registered farmers in eight

vernacular languages. Situation was under control wherever the advisories were implemented.

As a research institute the ICAR-CICR has been working hard to identify best practices across the globe, that can be adapted for India and adopted to enhance yields. Additionally, focus has been on indigenous native species such as *Gossypium arboreum* in efforts to establish sustainable low cost high yielding cotton production systems for India. With the natural robustness of *Desi* species where there is tolerance to insects, diseases and drought, development of new premium fibre varieties with 30 mm fibre length makes them precious. The institute will be coordinating multi-location trials of eight *Desi* varieties (*Gossypium arboreum*) with long staple fibre varieties, during 2016-17 at 15 locations across the country. The premium fibre *Desi* varieties suitable for spinnable purpose will have a special place in north India where American cotton hybrids were found to be highly susceptible to the cotton leaf curl virus in stark contrast to the *Desi* cotton varieties which are immune to the virus.

Scientists of the institute spearheaded the 'Mera Gaon Mera Gaurav' in 65 villages. Soil health cards were distributed in the villages and remedial measures were taken up. Five hundred tribal families were adopted by the institute under Tribal Sub Plan.

I am grateful to Dr T. Mohapatra, Secretary, DARE & DG, ICAR; Dr S. Ayyappan, former Secretary, DARE & DG, ICAR; Dr J. S. Sandhu, DDG (CS); Dr N Gopalakrishnan, former ADG (CC) and Dr R. K. Singh, ADG (CC) for their constant encouragement, guidance and support. The Heads of Divisions Dr Sandhya Kranthi, Dr Blaise Desouza and Dr Suman Bala Singh and Dr D. Monga, Head, Regional Station, Sirsa, and Dr A. H. Prakash, PC and Head, Regional Station, Coimbatore have contributed immensely to the technical execution of research programmes and their documentation in this report. I thank them for all for the excellent camaraderie and support. Dr M. V. Venugopalan, Dr M. S. Yadav and Mrs Vandana Satish deserve to be highly commended for their outstanding inputs and commitment to all aspects related to this annual report.

Hope is not a just a dream, it is about faith for dreams to come true. Science has the power to give shape to dreams. I earnestly hope that all our scientific efforts at the institute will eventually make our dreams for the farmers turn into reality. Our endeavour is to develop 'India-centric technologies' that can help the cotton farmer to cultivate cotton in a sustainable manner without the need for any harmful chemicals, at low production costs to obtain highest possible yields in ecologically compatible production systems. We hope to succeed.

(K. R. Kranthi)
Director

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