Annual Report 2014-15

CENTRAL INSTITUTE FOR COTTON RESEARCH, NAGPUR

भा.कृ.अनु.प
ICAR

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ICAR-CENTRAL INSTITUTE FOR COTTON RESEARCH, NAGPUR

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CENTRAL INSTITUTE FOR

COTTON

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Front Cover : MSH 53 (Vaidehi) Dark Brown Colour Linted culture (Reg. No. INGR 13032)

Back Cover : Suraj Variety (*G. hirsutum*) in HDPS

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PREFACE

Cotton crop showed its climate resilience once again. Monsoon arrived late by a month this year and rainfall distribution was erratic. Last year, 2013-14, the crop had to face excessive rains. In 2012-13, rains were deficient to the point of drought. Nevertheless cotton continued to perform. Yields in all three years continued to be above 500 kg lint per hectare. Surprisingly, despite the declining market prices over the past two years, farmers still preferred cotton over other crops. Cotton area in 2014 reached a record 12.9 million hectares. Interestingly, the CACP (Commission for Agricultural Costs and Prices, Ministry of Agriculture) concluded in its annual report 'Price policy for *kharif* crops -2014' that out of the 14 major *kharif* crops (Paddy, Maize, Jowar, Bajra, Ragi, Tur, Moong, Urad, Groundnut, Soyabean, Sunflower, Sesamum, Nigerseed and Cotton) cotton gained the maximum net returns at Rs. 31,790/ha, followed by tur at Rs. 19,260/ha and paddy at Rs. 15,679/ha. Certainly, it is the resilience of cotton that makes it the preferred farmers' choice. Though, cotton crop is innately tolerant to several abiotic stresses, what makes it transiently vulnerable to climate, sometimes is the kind of varieties/hybrids that are developed with specific focus on just a few economic attributes and the chemical intensive production practices that tilt the balance away from resilience. This must change.

The institute has been critically examining all factors that influence cotton production and marketing. The yields increased by 60-70%, during the previous decade, but the cost of cultivation increased more than 260% over the period. Fertilizer and insecticide usage also increased about two to three fold over the past five years. These changes are worrisome and need attention.

Efforts are made by the institute to find solutions to several of these intractable problems. New systems were developed to obtain high yields with least chemical inputs using a *Desi* variety 'Phule Dhanwantary'. A new promising variety CSH-3129 was developed for north India by the our Regional Station at Sirsa. CSH 3129 is tolerant to the dreaded leaf curl virus disease and has excellent fibre traits of 29.5 mm length and 23.5 g/tex strength with spinnability of 40s count. Another new promising variety CCH 2623 was identified for cultivation in south India under irrigated conditions. One hundred and ten (110) exotic accessions of *G. hirsutum* were procured from USA during 2014. A new 'Indian cotton varietal garden' was established to conserve varietal diversity. CNA 5, an introgressed line with pigmented plant body was registered as genetic stock with NBPGR New Delhi as INGR 14005. Three new naturally coloured *Desi* cotton (*G. arboreum*) cultures were developed. One hundred and fifty germplasm lines identified as tolerant to water logging for two consecutive years in field were screened under water logging in pot condition, of which 36 were identified as most tolerant.

Two patents were filed for 'CICR Precision Cotton Harvester' and 'Whitefly Suction Trap'. A new method of paper tubes 0.5 x 20 cm was developed for low cost nursery and easy transport. The method was found to be very promising especially when monsoon is delayed. A full length gene coding for gossypol detoxifying protein CYP6AE14 from *Helicoverpa armigera* was isolated and cloned. Cotton fiber strength associated genes expressed during secondary wall synthesis stage such as Sucrose synthase *(SusA1),* Cellulose synthase-7 *(CesA7)* Fasciclin-like arabinogalactan protein *(Ghfla11)* and Fasciclin-like arabinogalactan protein gene *(Ghfla12)* were cloned, sequenced, annotated and submitted to NCBI GenBank.Dual gene construct was developed with indigenous *CICR truncated cry2Ab1Ac* for bollworm

resistance and chitinase A gene from *Serratia marcescens* for disease resistance with chloroplast transit peptide (ctp) of Rubisco small subunit. Microbes that degrade glyphosate were isolated and characterized. Marker assisted breeding techniques are being used to transfer resistance to bacterial blight into the variety 'Suraj'. The introgression is at BC-1 (backcross-1) stage.

Several high yielding compact plant types with super okra leaf having good fibre quality have been identified which will be amenable for closer planting at a density of 2.5 lakh plants per hectare. Two new genotypes, CSH-3178 and H-1098i were found to be suitable for high density planting. The *Desi* varieties Phule Dhanwantary, MDLABB, CAN 418 and CAN 375 were found to be suitable for HDPS. The variety CISA 614 gave significantly high yield in high density planting in north India. Experiments were conducted to identify allelopathy and cover crops as weed control options. Thornless mimosa, sunnhemp, sorghum and forage cowpea recorded lesser weeds, better ground coverage and identified as suitable cover crops for cotton.

Farmers of Gujarat raised concerns about the incidence of pink bollworm on BGII in early to mid fruiting stage. Surveys conducted by CICR confirmed the concerns. It was found that farmers were extending the crop for 3-4 months beyond the normal harvest period to provide congenial conditions for pink bollworms to survive all through the year and thus accelerating resistance to Bt-cotton.

The recent communication technologies have enabled CICR to launch 'E-KAPAS' voice mail based weekly advisories that became very popular. The programme covered 728516 pre-recorded automatic phone calls to more than 1.0 lakh farmers across 11 cotton growing states involving 18 centres including SAUs working on cotton through mobile- based advisory services with CICR Nagpur as Lead centre. The advisories were provided in local languages as voice messages on a regular basis to registered on cotton production, protection technologies, weather and market information. Weekly advisories issued on the institute's web site in nine languages have become very popular with all stake-holders in the country. The institute disseminated its strategies for IRM on Bt Cotton and HDPS with non Bt varieties across 7376 acres in all the 11 cotton growing states.

Dr. S. Ayyappan, Secretary DARE and DG ICAR, is the main source of inspiration for the progress made. Dr J. S. Sandhu, DDG (CS) has been the guiding force for the excellent scientific achievements made by our scientists. I gratefully acknowledge the motivation provided by Dr B. V. Patil, chairman RAC and Dr N Gopalakrishnan, ADG (CC) for all our R&D endeavors. The Heads of Divisions Dr Sandhya Kranthi, Dr Blaise Desouza, Dr Suman Bala Singh, Dr D. Monga, Head, Regional Stations, Sirsa, and Dr A. H. Prakash, PC and Head, Regional Station, Coimbatore deserve appreciation for their inputs and editorial assistance. I would like to personally thank Dr M. V. Venugopalan, Dr M. S. Yadav and Mrs Vandana Satish for their supreme dedication to work and outstanding efforts.

Research will certainly show the way, but clearly for India to become a global leader in cotton there is more to be done. CICR has been exploring new avenues, new concepts and renewed thinking to develop a roadmap towards high yields at low production costs and least chemical inputs. I earnestly hope that we receive no-holds barred support from all concerned to enable us succeed for India's cotton future.

(K. R. Kranthi)
Director

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