



General

## 11.1 List of Publications

### Papers Published in Research Journals

Ahuja, S. L., Dhayal, L. S. Monga, D. (2009). Performance of upland coloured cotton germ plasm lines in line 3 tester crosses. *Euphytica*, 169:303-312.

Ahuja, S.L., Banerjee S.K., Singh Jagmail, Singh P., Singh V.V., Monga D. and Tuteja O.P. (2009). Development of *Gossypium hirsutum* lines with cytoplasmic bollworm tolerance from *G. arboreum* and *G. tomentosum*. *Plant Breeding*, 128,712-715.

Amutha, M., Alagar, M. and Chozhan, K. (2009). Synergistic effect of *Azospirillum brasilense*, VAM, organic and inorganic fertilizers on *Scirpophaga incertulus* Wlk. on *Oryza sativa* L. *Annals of Plant Protection Sciences*, Vol. 17(2),375-379.

Amutha, M., Alagar, M. and Chozhan, K. (2009). Synergistic effects of *Azospirillum brasilense* (T) and *Vesicular Arbuscular Mycorrhiza* (VAM- *Glomus* spp.) combined with organic and inorganic fertilizers on the infestation of rice yellow stem borer *Scirpophaga incertulus* Wlk. under rainfed condition. *Journal of Plant Protection and Environment*, 6(2):50-58.

Amutha, M., Manisegaran, S. and Alagar, M. (2009). Ovipositional and orientational behaviour of *Helicoverpa armigera* (Hubner) on selected tomato accessions. *Annals of Plant Protection Sciences*, Vol. 17(1),59-64.

Bandyopadhyay, K.K., Ghosh, P.K., Hati, K.M. and Misra, AK. (2009). Efficient utilization of limited available water in wheat through proper irrigation scheduling and integrated nutrient management under different cropping systems in a Vertisol. *Journal of the Indian Society of Soil Science*, 57(2): 121-128.

Bandyopadhyay, K.K., Misra, AK., Ghosh, P.K., Hati, K.M., Mandai, K.G. and Mohanty, M. (2009). Effect of irrigation and nitrogen application methods on input use efficiency of wheat under limited watersupply in a Vertisol of Central India. *Irrigation Science*, 28: 285-299.

Bandyopadhyay, K.K., Prakash, AH., Sankaranarayanan, K., Dhara Jothi, B. and Gopalakrishnan, N. (2009). Effect of

irrigation and nitrogen on soil water dynamics, productivity and input-use efficiency of Bt cotton in a Vertic Ustropept. *Ind. J. Agric. Sci.*, 79 (6): 448-453.

Banu, J.G., Surulivelu, T, Amutha, M and Gopalakrishnan, N. (2010). Susceptibility of different developmental stages of the cotton mealy bug, *Paracoccus marginatus* (Williams and Granara de Willink) to entomopathogenic fungi. *Annals of Plant Protection Sciences*, Vol. 18(1),247-248.

Blaise, D., Singh J. V. and Bonde A N. (2009). Response of rainfed cotton (*Gossypium hirsutum*) to foliar application of potassium. *Indian J. of Agronomy*, Vol. 54 (4);444-448.

Chakrabarty, P.K., Chavhan, RL., and Ghosh, A. (2009). Rapid and efficient protocols for throughput extraction of high quality plasmid DNA from strains of *Xanthomonas axonopodis* pv. *malvacearum* and *Escherichia coli*. *J. Plant Biochem. & Biotech.*, 19: 99-102.

Damre P.R, Challa O., Venugopalan MV and Goswami S.N. (2009). Impact of organic farming system on soil properties-A case study. *PKV Res. J.*, Vol. 33(1): 18-20.

Dharajothi, B., Surulivelu, T., Gopalakrishnan, N. and Manjula, TR. (2009). Occurrence of papaya mealy bug, *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera: Pseudococcidae) on cotton. *J. Bioi. Control*, 23(3): 321-323.

Dharajothi, B., Gopalakrishnan, N., Natarajan, K. and Manjula, TR (2009). Evaluation of certain insecticides against pink bollworm *Pectinophora gossypiella* Saunders. *Journal of Indian Society for Cotton Improvement*, 34(2):91-95.

Galkate, UV and Rokde, S.N. (2009). Effect of varying levels of dietary aflatoxins on certain nutritional parameters and economics in White Leghorn layers'. *Indian Journal of Poultry Science*, Vol :44(2): 207 211.

Galkate, UV and Rokde, S.N. (2010). Effect of dietary aflatoxin on certain egg production and quality parameters in White Leghorn Layers. *Animal Nutrition and Feed Technology*



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- Kranthi, K. R (2009). Cotton Pest Management- What Next? *Crop Care*, 34 (4),17-25.
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- Nalayini, P, Anandham, R, Sankaranarayanan, K. and Rajendran,TP. (2009). Polyethylene mulching for enhancing crop productivity and water use efficiency in cotton (*Gossypium hirsutum*) and maize (*Zea mays*) cropping system. *Indian Journal of Agronomy* ,54 (4):409-414.
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Shanthy, v., Singh Jagvir and Anshu.y. (2009). Effect of seed index on varietal performance in upland cotton (*G. hirsutum* L.) *Seed Research*, Vol. 37(1&2):175-78.

Shanthy, v., Rathinavel, K., Palve S.M. and Visvanathan Anshu. (2009). Interrelationship of seed reserve utilization components in desi cotton (*Gossypium arboreum*). *Indian Journal of Genetics*, 69(1): 69-79.

Shaw, R.K., Acharya, L.K. and Mukherjee, A.K. (2009). Assessment of Genetic Diversity in a Highly Valuable Medicinal Plant *Catharanthus roseus* using Molecular Markers. *Crop Breeding and Applied Biotechnology* (Brasil), 9:52-59.

Tayde, U.D., Zinjarde, R.M., Rokde, S.N. and Ingole, A.S. (2010). Phenotypic characteristics of Gaolao strain of Nagpuri buffaloes in Wardha district of Maharashtra, *PKV Research Journal*, Vol. 80 (1): 65-67.

Tayade, A.S. and Dhoble, M.V. (2009). Dry matter partitioning and plant growth response of transgenic Bt and non Bt cotton. *Indian J. Plant Physiol*, 14(2):174-180.

Tayade, A.S. and Dhoble, M.V. (2010). Effect of nutrient and pest management modules on incidence of bollworm complex of transgenic Bt cotton. *Pestology*, 34 (3):30-41.

Thaware, Y.M., Ingale, R.M., Zinjarde, R.M., Rokde, S.N. and Atkari, M. (2009). Preparation of burfi from goat milk blended with varying levels of different fruit pulps. *Indian Journal of Dairy Science*, 62(4):1-5.

Tuteja, A. P., Mehta Anil and Hasan Hamid (2008). Impact of plant densities and nitrogen level on seed cotton yield and fibre quality on promising hybrids of *Gossypium hirsutum* L. *J. Indian Soc. Cotton Improv.*, 33:54-56.

Tuteja, A.P., Khadi B. M., Monga D., Verma S. K., Ahuja S. L., Meena R. A. and Suresh Kumar (2009). CSHH 243- A quality cotton hybrid for North zone. *J. Indian Soc. Cotton Improv.*, 34:38-41.

Venugopalan, M.V., Sankaranarayanan, K., Blaise D., Nalayini, P., Praharaj, C.S. and Gangaiah, B. (2009). Bt Cotton (*Gossypium* sp.) in India and its agronomic requirements-A review. *Indian Journal of Agronomy*, 54(4):343-360.





## 11.2 List of on-going Projects

### Institute Projects

Sl. No.	Name of Project	Name of Project Leader & Associate(s) Dr.	Duration
<b>Crop improvement</b>			
1.	Collection, conservation, evaluation, documentation and maintenance of germ plasm of cultivated species of <i>Gossypium</i>	Punit Mohan (PL), S. Manickam (PA) S. J. Gawande (PA), V.S. Nagraire (PA), R. A. Meena (PA), A. B. Dongre (PA), Anjali Kak (PA)	2006-2013
2.	Development of core assembly of <i>Gossypium barbadense</i> , <i>G. arboreum</i> and <i>G. herbaceum</i> germplasm	Punit Mohan (PL), KPM Dhamayanthi (PA)	2008-2012
3.	Development of mapping population for different economically important traits	Head, DCI (PL), V. N. Waghmare (PA) S. M. Palve (PA), S. B. Singh (PA), Vinita Gotmare (PA), T. R. Loknathan (PA) P.R. Vijayakumari (PA), S. Manickam (PA) Punit Mohan (PA)	2008-2012
4.	Improvement of tetraploid and diploid cottons for fibre properties through population improvement approaches	V. N. Waghmare (PL), Vinita Gotmare (PA)	2000-2010
5.	Breeding of upland cotton for improved fibre quality and resistance to biotic stress (bollworms and jassid)	S. M. Palve (PL), M. K. Meshram (PA) S. Venilla (PA), V. Gotmare (PA)	2005-2010
6.	Development of heterotic pool for superior medium staple in tetraploid cotton ( <i>G. hirsutum</i> )	S. M. Palve (PL)	2006-2011
7.	Development of <i>hirsutum</i> genotypes having high oil content coupled with fibre productivity and quality	S. M. Palve (PL)	2008-2013
8.	Studies on genetic enhancement of upland cotton	T. R. Loknathan (PL)	2002-2010
9.	Conservation, characterization and utilization of wild species, races of cultivated species, perennials and synthetic polyploids of <i>Gossypium</i>	Vinita Gotmare (PL), G. Balasubramani (PA)	2008-2013
10.	Identification of genetic markers and characterization of fibre strength and drought tolerance traits in interspecific cross between <i>G. herbaceum</i> and <i>G. anomalum</i>	Vinita Gotmare (PL)	2008-2013
11.	Genetics and development of diploid and tetraploid cottons through inter-racial hybridization for fibre quality, biotic & abiotic stress tolerance	Vinita Gotmare (PL), S. M. Palve (PA)	2008-2013
12.	Diversification of male sterile cytotypes genetic studies and utilization of cleistogamy and protruding stigma in <i>Gossypium</i> spp.	Vinita Gotmare (PL)	2008-2013
13.	Development of drought tolerant genotype with good fibre quality	S. B. Singh (PL), A. H. Prakash (PA)	2008-2013
14.	Development of improved male sterility system through induced mutation	S. B. Singh (PL), O. P. Tuteja (PA)	2008-2011
15.	Development of transgenic diploid cotton for insect Resistance	S. B. Nandeshwar (PI), V. S. Nagraire (PA), S. M. Palve (PA)	2008-2011
16.	<i>In-vitro</i> cell manipulation for induction of somatic embryogenesis and plant regeneration in diploid and tetraploid cotton	S. B. Nandeshwar (PL), A. H. Prakash (PA)	2008-2011
17.	Development of long staple <i>G. hirsutum</i> with improved fibre strength	S. Manickam (PL), V. N. Waghmare (PA) S. L. Ahuja (PA)	2008-2014
18.	Development of extra-long staple high spinning hybrids with wider adaptability	KPM Dhamayanthi (PL), S. Manickam (PA)	1986-2011
19.	Induction of polyploidy and introgression of agronomical traits from diploid wild species to cultivated tetraploids	K.P.M. Damayanti (PL), Vinita Gotmare (PA)	2008-2012
20.	Molecular basis of pathogenicity and race-specificity of <i>Xam</i> and characterization of antagonists of foliar pathogens of cotton for biocontrol	P. K. Chakrabarty (PL)	1994-2009

21.	Development of transgenic cotton resistant against major diseases of cotton.	P. K. Chakrabarty (PL), S. B. Nandeshwar (PA), A. H. Prakash (PA)	2009-2012
22.	Isolation of fibre specific trichome specific promoter from <i>G. hirsutum</i> / <i>A. thaliana</i>	G. Balasubramani (PL), J. Amudha (PA)	2008-2011
23.	Development of drought resistant transgenic cotton and identification of new gene for high water use efficiency	J. Amudha (PL), A. H. Prakash (PA) G. Balasubramani (PA)	2008-2011
24.	Molecular mapping of leaf curl virus resistance gene in the cotton genome	J. Amudha (PL), D. Monga (PA) G. Balasubramani (PA)	2002-2009
25.	Molecular evaluation of cotton germplasm	A. B. Dongre (PL), Punit Mohan (PA)	2000-2011
26.	Development of efficient agro-techniques for enhancing the productivity and seed quality of Bt cotton varieties	R. K. Deshmukh (PL), K. Rathinavel (PA)	2008-2011
27.	Performance of evaluated new Bt hybrids on large size plots (138.24 sq. Mt.)	R. K. Deshmukh (PL), P. R. Vijayakumari (PA), V. Santhy (PA)	2008-2011
28.	Studies on cotton seed with particular reference to germination and dormancy	P. R. Vijayakumari (PL), R. A. Meena (PA) R. K. Deshmukh (PA), V. Shanthi (PA)	2004-2009
29.	Assessment of working seed sample size for Bt seed testing based on estimation of Cry 1Ac protein	P. R. Vijayakumari (PL), K. R. Kranthi (PA)	2008-2010
30.	Studies on seed quality parameters and genetic purity of TFL seed sold in market	P. R. Vijayakumari (PL), K. R. Kranthi (PA) K. Rathinavel (PA), R. A. Meena (PA)	2008-2011
31.	Assessment of seed vigor trait in cotton	V. Santhy (PL), P. R. Vijayakumari (PA), Jagvir Singh (PA)	2003-2010
32.	<b>Phenotyping and genotyping of cotton genotypes</b>	V. Santhy (PL), K. Rathinavel (PA) G. Balasubramani (PA)	2008-2012
33.	Transgene expression and effect of transgene on quantity and quality in seeds of Bt cotton hybrids	V. Santhy (PL), S. B. Nandeshwar (PA), G. Balasubramani (PA)	2008-2011
34.	Utilization of electromagnetic field seed treatment for the enhancement of cotton seed quality and productivity under diversified agro-ecological situations (Ad hoc)	K. Rathinavel (PI), P. R. Vijayakumari (Co-PI), R. A. Meena (Co-PI)	2008-2010
35.	Studies on salt tolerance (Ad hoc)	S. L. Ahuja (PL), R. A. Meena (PA)	2008-2010
36.	Development of varieties and hybrids resistant to CLCuV	a. p. Tuteja (PL), D. Monga (PA), Rishi Kumar (PA)	2008-2013
37.	Technology to enhance the better crop establishment and yield in cotton.	R. A. Meena (PL), D. Monga (PA)	2007-2012
38.	Development of GMS based hybrids and pre-breeding for fibre quality in <i>G. arboreum</i>	S. K. Verma (PL), S. L. Ahuja (PA)	2008-2013
39.	Development of heterotic pools in <i>G. arboreum</i> and <i>G. hirsutum</i>	S. K. Verma (PL), a. p. Tuteja (PA), S. L. Ahuja (PA)	2008-2012
40.	Marker Assisted Selection for developing elite breeding lines in cotton	S. K. Verma (PL), S. L. Ahuja (PA)	2008-2012
41.	Breeding new <i>G. hirsutum</i> varieties with new plant type - Development of medium staple varieties.	K. N. Gururajan (PL), S. Manickam (PA)	1989-2011
42.	Development high yielding and high spinning extra long cotton staple varieties.	K. N. Gururajan (PL), S. Manickam (PA)	1989-2011
<b>Crop production</b>			
43.	Nutrition requirement of soybean-Bt hybrid cotton in participatory mode	A. R. Raju (PL), M. K. Meshram (PA), G. Majumdar (PA)	2008-2012
44.	Agronomic and physiological evaluation of NHH 44 Bt and BN-Bt cotton under rainfed conditions on Vertisols and associated soils	M. V. Venugopalan (PL), M. Chakrabarty (PA), K. K. Bandyopadhyay (PA)	2009-2013
45.	Studies on long term effect of fertilizer and integrated nutrient management on productivity, soil fertility and quality of rainfed hybrid cotton	Jagvir Singh (PL), M. V. Venugopalan (PA), K. Velmourougane (PA)	2004-2025
46.	Studies on impact of transgenic cotton on soil microbial and biological properties under cotton based cropping systems	K. Velmourougane (PL), Jagvir Singh (PA), P. Nalayini (PA)	2008-2011
47.	Developing efficient carrier based microbial delivery system for cotton nutrition and soil health	K. Velmourougane (PL), Jagvir Singh (PA), A. R. Raju (PA)	2008-2011



48.	Effect of different nitrogen levels on oil and protein content in Bt and non-Bt cotton hybrids and effect of Bt gene on cotton seed oil content..	M. Chakrabarty (PL), M. V. Venugopalan (PA)	2007-2010
49.	Assessment of gossypol content in cotton germplasm	M. Chakrabarty (PL)	2004-2012
50.	Economic analysis of cotton based farming system in Vidarbha.	p. R. Deoghare (PL), S. M. Wasnik (PA)	2007-2010
51.	Capital requirement for modernization of cotton production on marginal and small farm in Vidarbha	P. RDeoghare (PL), A. R. Reddy (PA) S. M. Wasnik (PA)	2008-2010
52.	Economic Impact of Bt Cotton cultivation in India	A. R. Reddy (PL), Isabella Agarwal (PA), Rishikumar (PA)	2008-2010
53.	Assessment of cotton based intercropping system and its popularization through farmers to farmers participatory learning approach.	S. M. Wasnik (PL), S. Usha Rani (PA), A. R. Raju (PA)	2008-2012
54.	Performance of Osmanabadi goats under feeding of Bt and Non Bt cotton leaves	S. N. Rokde (PL)	2007-2009
55.	Bio-mulching and biodegradable mulching for Bt cotton based cropping system.	P. Nalayini (PL), K. Sankaranarayanan (PA), K. Velmourougane (PA)	2008-2010
56.	Assessment of productivity potential of genotype vis-a- vis Bt hybrids through agronomic manipulation.	C.S.Praharaj (PL), K.Sankaranarayanan (PA), N.Gopalakrishnan (PA)	2007 -2009
57.	Water management in <i>hirsutum</i> & <i>barbadense</i> cotton	K.Sankaranarayanan (PL), P. Nalayini (PA), C.S.Praharaj (PA), K. K. Bandyopadhyya (PA), P.Nalayini (PL), K.Sankaranarayanan (PA), K.velmourougane (PA)	2004-2010 2008-2010
58.	Herbigating herbicide/ herbicide mixture/ herbicide rotation for efficient and environmentally safe weed control and its effects on succeeding pulses	P.Nalayini (PL), K.Sankaranarayanan (PA), K.velmourougane (PA)	2008-2010
59.	Simulation of effect of irrigation and nitrogen on soil water and nitrogen dynamics, productivity and input use efficiency of Bt cotton in a vertic Ustropept	K. K. Bandyopadhyya (PL), A. H. Prakash (PA), B. Dharajothi (PA)	2006-2009
60.	Studies on soil aggregation and aggregate associated carbon in cotton based cropping system	K .K .Bandyopadhyya (PL), K. Velmourougane (PA)	2008-2010
61.	Simulation of effect of N management strategies on nitrogen dynamics in soil plant system and nitrogen use efficiency of ELS Bt cotton in a climate change scenario (Ad -hoc)	K.K.Bandyopadhyya (PL),A.. H. Prakash (PA), B.Dharajothi (PA), C.S.Praharaj(PA)	2009-2012
62.	Identification and utilization of adaptive responses to abiotic stresses in cotton	S. E. S. A. Khader (PL) N.Gopalakrishnan (PA), K.N.Gururajan (PA)	1995-2009
63.	Studies on the mechanism of cuticular absorption of nutrients and hormones in Bt cotton	S.E.SAKhader (PL)	2008-2012
64.	Economic analysis of contract farming in cotton in TN	Isabella Agarwal (PL)	2005-2009
65.	Adoption, impact and return to research investment in improved cotton cultivars in Tamil Nadu	Isabella Agarwal (PL)	2005-2009
66.	Post evaluation of farmers field schools on cotton	S.Usha Rani (PL), K.Sankaranarayanan (PA)	2007-2010
67.	Documentation and validation of farmers indigenous knowledge on farming system approach in cotton	S. Usha Rani (PL), P. Nalayini (PA)	2007-2010
68.	Comparative analysis of conventional, biotech and organic cotton production systems in India	S. Usha Rani (PL), S. MWasnik (PA) K. Sankaranarayanan (PA)	2008-2011
69.	An empirical analysis on cultivation behaviour of Bt cotton growers with regard to insect resistance management technologies	S.Usha Rani (PL), S.MWasnik (PA)	2008-2011
<b>Crop protection</b>			
70.	Basic studies on bollworm resistance to Bt cotton and development of management strategies	K. R. Kranthi (PL)	2008-2011
71.	Exploitation of induced resistance for cotton pest management	S. Kranthi (PL)	2008-2010
72.	Isolation and characterization of native Bt strains using conventional and molecular methods, for cotton pest management	S. Kranthi (PL), K. R. Kranthi (PA)	2008-2010

73.	Population and community ecology of cotton entomofauna	V. S. Nagrare (PL)	2006-2011
74.	Evaluation and exploitation of compensation as a mechanism for comprehensive insect pest tolerance	V. S. Nagrare (PL), Vinita Gotmare (PA)	2006-2011
75.	Studies on bionomics and management of mealy bug	V. S. Nagrare (PL), K. R. Kranthi (PA)	2008-2011
76.	Ecological - based approaches for sustainable sucking pests management	V. S. Nagrare (PL)	2008-2010
77.	Studies on seed transmitted pathogenic infections and other seed microflora of cotton	P. M. Mukewar (PL)	1989-2009
78.	Screening and Identification of <i>effective</i> bio-control agents for the management of foliar cotton diseases	M. K. Meshram (PL), S. J. Gawande (PA)	2008-2011
79.	Identification of bacterial blight and grey mildew disease resistant genotypes in upland cotton.	M. K. Meshram (PL)	2008-2011
80.	Identification of sources of resistance against Rhizoctonia root rot in tetraploid and fusarium wilt in diploid cotton and their utilization in breeding program	R. C. Ukey (PL), V. N. Waghmare (PA)	2006-2011
81.	Studies on cotton viral diseases (Ad-hoc)	A. K. Mukherjee (PL), M. K. Meshram (PA) V. Jayakumar (PA)	2009-2010
82.	Studies on inoculums source and economic thresholds of cotton leaf curl and virus disease	D. Monga (PL), Rishi Kumar (PA)	2008-2011
83.	Bio-ecology and sampling of mealybug in Bt-cotton.	Rishi Kumar (PL), D. Monga (PA).	2008-2011
84.	Impact of systemic insecticide on sucking pests and non target arthropod communities in Bt and Non Bt cotton	Rishi Kumar (PL)	2008-2011
85.	Studies on the role and effect of insecticides in cotton ecosystem	T. Surulivelu (PL), K. Natarajan (PA)	1989-2011
86.	Studies on the population dynamics of cotton pests and their natural enemies in cotton eco-system	K. Natarajan (PL), B. Dharajothi (PA)	2008-2010
87.	Developing resistant genotypes to jassid	K. Natarajan (PL), KPM Damayanthi (PA)	2008-2012
88.	Standardization of bioassays techniques for resistance monitoring in <i>Pectinophora gossypiella</i> Saunders to transgenic cotton and development of management strategies	B. Dharajothi (PL)	2007-2012
89.	Pesticides, sucking pests and predator interaction on Bt cotton	B. Dharajothi (PL)	2008-2010
90.	Studies on epizootiology, pathogenicity and pathogenic mechanism of Entomopathogenic fungal pathogens against cotton mealybug	M. Amutha (PL)	2008-2011
91.	Establishment of <i>Beauveria bassiana</i> as a symbiotic insecticide against major insect pests and diseases of cotton	M. Amutha (PL), M. Gunasekaran (PA)	2009-2012
92.	Studies on biochemical, molecular and genetic basis of host plant resistance to cotton nematodes	N. G. Narkhedkar (PL)	2006-2010
93.	Potential of rhizobacteria in management of cotton nematodes	N. G. Narkhedkar (PL)	2006-2010
94.	Isolation identification and characterization of insecticidal toxins from heat tolerant isolate of EPN bacterial system	N. G. Narkhedkar (PL)	2008-2011
95.	RNAi mediated crop protection against root-knot nematode	N. G. Narkhedkar (PL), P. K. Charkrabarty (PA)	2009-2012
96.	Identification of hot spots for plant parasitic nematodes in cotton growing zones of India	Gulsar Banu (PL), N. G. Narkhedkar (PA)	2006-2011
97.	Isolation of <i>novel</i> insecticidal proteins from bacterial symbionts of <i>native</i> entomo-pathogenic nematodes	Gulsar Banu (PL), N. G. Narkhedkar (PA), B. Dharajothi (PA)	2006-2011

#### EXTERNALLY FUNDED PROJECTS

##### DST/ DBT

98.	DST; Molecular mapping of fibre quality traits QTLs and marker assisted selection (MAS) in upland cotton ( <i>Gossypium hirsutum</i> L.)	V. N. Waghmare (PI)	2007-2010
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99.	DBT; Molecular mapping of fibre quality and lint yield traits: construction of a framework linkage map in desi cotton ( <i>Gossypium sp.</i> )	VNWaghmare (PI), A.BDongre (PA) Vinita Gotmare (PA), Er Manoj Kumar (PA)	2006-2009
100.	DBT; Engineering virus resistant cotton through dsRNAi-mediated targeting of cotton leaf curl virus	P. K. Chakrabarty (PI), S. B. Nandeshwar (PA), D. Monga (PA), B. M. Khadi (PA)	2007-2010
101.	DBT; Identification of Molecular markers and tagging genes for Bacterial blight resistance	P. K. Chakrabarty (PI), Punit Mohan (PA), V. N. Waghmare (PA), B. M. Khadi (PA)	2008-2011
102.	DBT : "Gene stacking in Bt Cotton"	G. Balasubramani (PI) S. B. Nandeshwar (CCPI), S. B. Singh (CCPI)	2008-2010
103.	DBT; Development of cotton transgenic with improved fibre strength using cellulose synthase gene from <i>Arabidopsis</i>	G. Balasubramani (PI), J. Amudha (CCPI)	2007-2009
104.	DBT; Indo-Australian Project: Enhancing sustainability of transgenic crops through gene stacking	K. R. Kranthi (PI)	2008-2012
<b>NAIP</b>			
105.	Georeferenced soil information system (GeoSIS) for land use planning and monitoring soil and land quality for agriculture	MVVenugopalan (CCPI), K. Velmourougane (CCPI)	2009-2013
106.	A value chain for cotton fibre, seed and stalks: an innovation for Higher Economic Returns to Farmers and Allied Stake holders	N. Gopalakrishnan Consortium partner and CoPI, Sankaranarayanan (Co oPI) P. R. Bharambe (Team Leader, Nagpur) D. Monga, (Team Leader, Sirsa)	2008-2012
107.	Research into development of decision support systems for management of insect pests of major rice and cotton based cropping systems	V. S. Nagrare (CCPI), G. Majumdar (CoPI) Rishi Kumar (CoPI), B. Dharajothi (CoPI) M. Sabesh (CoPI), M. Amutha (CoPI)	2008-2012
<b>OTHER PROJECTS</b>			
108.	Transgenics in Crops (NPTC): Development of bollworm resistance transgenic cotton (ICAR-Network Project)	G. Balasubramani (PI), S. B. Singh (CCPI), J. Amudha (CCPI), S. B. Nandeshwar (CCPI), A. B. Dongre (CCPI), K. R. Kranthi (CCPI), P. K. Chakrabarty (CCPI)	2006-2012
109.	Impact, adaptation and vulnerability of Indian agriculture to climate change. Sub project-- changes in soil carbon reserves as influenced by different ecosystems and land uses in India. (ICAR Network project)	1. Bhattacharyya, NBSS&LUP (PI): M. V Venugopalan, (CCPI), P Chandran, NBSS&LUP (CCPI)	2009-2012
110.	Testing & Documentation of Extant Varieties, hybrids and their Parents for Distinctness, Uniformity & Stability (PVP & FR ACT, 2001). (DUS)	N. Gopalakrishnan (PI), K. Rathinavel (CCPI), VSanthy (CCPI) P.R. Vijayakumari (CCPI) R. K. Deshmukh (CCPI)	2003-2012
111.	Novel approaches for production of hybrid seeds with characteristics of improved insect resistance and higher Yield. Funded by the CSIR, under the New Millennium Initiative project	K. R. Kranthi (PI)	2008-2012
112.	Development of technology for Detecting Presence of GMOs in an Unknown Sample and its Utilization in dealing with Bulk Samples. (Ministry of Agriculture, Government of India GMO Project)	K. R. Kranthi (PI)	2006-2009
113.	Monitoring changes in baseline susceptibilities to cry1Ac in geographic populations of <i>H. armigera</i>	S. Kranthi (PI), K. R. Kranthi (CCPI)	2002-2012
114.	Monitoring changes in baseline susceptibilities to cry2Ab & cry1Ac +cry2Ab in geographic populations of <i>H. armigera</i>	S. Kranthi (PI), K. R. Kranthi (CCPI)	2002-2012
115.	Monitoring changes in baseline susceptibilities to JK toxin (Event 1) in geographic populations of <i>H. armigera</i>	S. Kranthi (PI), K. R. Kranthi (CCPI)	2002-2012
116.	Studies on <i>H. armigera</i> response to Rynaxypyr (DuPont Project) (Funded by Dupont)	K. R. Kranthi (PI)	2006-2009
117.	Implementation of PVP legislation 2001 (Ad hoc)	K. Rathinavel (PI) S.Manickam (Co-PI)	2008-2009
118.	Seed production in agricultural crops and fisheries	K.Rathinavel (PI)	2006-2014
119.	National Seed Project (crops).	K,Rathinavel (PI)	1999-2012



120. Awareness-cum-Surveillance Programme for Management of Major Pests in Soybean-Cotton Based Cropping System in Maharashtra (2009-10) (Funded by Government of Maharashtra)

V. S. Nagrare (PI)

2009-2010

## Technology Mission on Cotton (TMC): Mini Mission I 2007-2012

Project code	Project Title	Name of PI/CCPI Dr.
MM 1.1	Development and promotion of medium and long linted diploid cottons ( <i>G.arboreum</i> and <i>G.herbaceum</i> )	S. K. Verma - PI T. R. Loknathan - CCPI
MM 1.2	Development of extra long staple <i>G.barbadense</i> cotton with improved fibre qualities to meet the requirements of textile industry	K. N. Gururajan - PI
MM 1.3	Identification of <i>G. hirsutum</i> genotypes suitable for machine picking and development of agronomic package	V. Gotmare - CCPI
MM 1.4	Development and promotion of Bt transgenic cotton for bollworm Resistance	S. Manickam - CCPI, Suman Bala Singh, S. B. Nandeshwar, S. M. Palve, O. P. Tuteja, S. K. Verma.
MM 1.5	Molecular characterization of cotton germ plasm using DNA Markers	A. B. Dongre, V. N. Waghmare.
MM 1.6	Exploitation of apomixis and TGMS System in hybrid cotton seed production	S. M. Palve - PI V. Gotmare - CCPI, V. Santhy.
MM 2.1	Development of production technologies for Bt cotton and improvement of water and nutrient use efficiency with precision farming techniques	J. V. Singh - PI C. S. Praharaj - CCPI, P. R. Bharambe, M. V. Venugoplan.
MM 2.2	Identification of <i>innovative</i> Bt cotton based cropping systems improvement of water and nutrient use efficiency with precision farming techniques	P. Nalayini - PI K. K. Bandopadhyay - CCPI, A. R. Raju, P. R. Bharambe, R. A. Meena.
MM 2.3	Mechanization of cotton production	G. Majumdar-PI, A. R. Raju-CCPI
MM 2.4	Physiological manipulation of Bt plant morphoform for enhanced productivity under <i>varied</i> agro-climatic conditions	A. H. Prakash - PI R. K. Deshmukh - CCPI
MM 3.1	Emerging and key pests of Bt cotton- their characterization, taxonomy, genetic diversity and control	K. R. Kranthi - PI, T. Surulivelu - CCPI, Dharajyoti, S. Kranthi, V. S. Nagrare, M. K. Meshram.
MM 3.2	Development and validation of IPM/IRM strategies for Bt cotton under different ecosystems	S. Kranthi - CCPI V. S. Nagrare - CCPI Rishi Kumar - CCPI
MM 3.3	Development, validation, utilization and / or commercialization of bio-pesticides and bio inoculants	P. K. Chakrabarty - PI T. Surulivelu - CCPI J. Gulsar Banu - CCPI N. Narkhedkar - CCPI D. Monga - CCPI
MM 3.4	Development of farmerfriendly diagnostic kits for transgenic <i>event</i> seed	K. R. Kranthi - CCPI
MM 4.1	Quality evaluation of cotton fibres	M. Chakrabarty - CCPI
MM 5.1	Total factor productivity of cotton in India	Isabella Agarwal - PI A. R. Reddy - CCPI
MM 5.3	Indian cotton portal	M. Sabesh - PI N. Gopalakrishnan - CCPI G. Majumdar-CCPI

## Technology Mission on Cotton: Mini Mission II 2007-2012

Project Title	Name of PI/CCPI Dr.
Dissemination of IRM strategies in 500 villages of India	K. R. Kranthi (PI) B. Dharajyoti - CCPI D. Monga - CCPI Rishi Kumar - CCPI

### 11.3: Consultancy, Patents, Commercialization of Technology

Following implements developed have been filed for patents with provisional application

1. Bullock drawn vertical rotor planter for vertisols (Prov. Pat., No.1559/MUM/2009)

2. Cotton Seed Blower (Prov. Pat., No. 1560/ MUM /2009)

3. Solar powered knapsack sprayer (Prov. Pat., No. 1561/MUM/2009)

4. Notification of *G. arboreum* variety CISA 614 for Commercial Cultivation in North Zone

The variety CISA 614 was tested in 32 locations in the North Zone (Punjab, Haryana and Rajasthan) during 2004-2007 and has recorded an overall mean seed cotton yield of 2204 kg/ha as against 1834 kg/ha of HD 123 (zonal check) and 1990 kg/ha of local checks. It was identified by Variety Identification Committee Meeting (AICCIP) held at ANGRAU, Hyderabad 6-8 April, 2009 and notified vide Gazette of India NO.608 dated April 1, 2010.

5. Notification of *G. arboreum* variety CISA 310 for commercial cultivation in north zone

The variety CISA 310 of *Gossypium arboreum* developed at CICR, Regional Station, Sirsa, has been notified vide Gazette of India NO.171 dated January, 2010 for cultivation under irrigated conditions of entire north zone due to its overall superiority in both seed cotton and lint yield, better fibre quality than the check and less boll damage.

6. Notification of *G. hirsutum* variety, CNHO 12 for commercial cultivation in central zone (irrigated condition)

*G. hirsutum* variety, CNHO 12 (Saraswati) has been identified for release in the Central zone under irrigated conditions during the year 2009-10. The variety is characterized by dwarf stature, early maturity (160-165 days), medium to high seed oil content (21.8 %) with synchronous boll bursting. It has recorded seed cotton yield of 1501 kg/ha as against 1251 kg/ha of the zonal check LRA 5166. In the wake of shortage of short staple and medium staple categories of cotton in the country, the new variety CNHO 12, spinnable to 20s counts was recommended for release for its suitability for manufacture of denim. The variety has been assigned with the National Identity Number IC 574486.

7. Release of first public sector Bt cotton hybrid NHH 44-Bt for commercial cultivation

The first public sector Bt hybrid NHH 44-Bt was developed indigenously by using BN Bt as female parent and approved for commercial cultivation by the GEAC, New Delhi on 13<sup>th</sup> May, 2009. The BN Bt is very good combiner for hybrid production and it was developed by incorporating Bt *cry1 Ac* gene. The expression of Cry protein level is high i.e. up to 5.8 ppm. The hybrids were evaluated in all the cotton growing zones and found very promising. It was developed through collaborative efforts of the University of Agricultural Sciences (UAS), Dharwad, National Research Centre for Plant Biotechnology (NRCPB), New Delhi and Central Institute for Cotton Research (CICR), Nagpur.

8. Seed Production

Nagpur

Under the Mega Seed production programme, seeds of 13 elite cultivars of cotton along with wheat and pulses were produced. A sizeable resource of Rs. 6.72 lakhs approximately was earned through the sale proceeds.

Crop	Stage	Production (Q)
Cotton -13 varieties	TFL	32.89
Wheat cV.HD2189	Foundation Seed	40.90
Red Gram-BSMR	TFL	73.80
Gram-Vijay	CS	29.80
Wheat-GW-496	CS	55.98

#### Coimbatore

#### Breeder Seed Production

Variety	Breeder Seed production (kapas in kg)	Breeder seed distribution (seeds in kg)
LRA5166	326	111
MCU 5 VT	-	69*
Surabhi	130	111
Suraj	192	54
Supriya	94	6
Suvin	235	33
Total	977	384

\*From Carried over stock

#### Sirsa

#### Maintenance of Nucleus and Breeder seeds

No	Variety	Quantity (kg)
1	CSHH 198 (F)	45
2	CSHH 198 (M)	38
3	CSHH 243 (F)	25
4	CSHH 243 (M)	10
5	CSHH 238 (F)	35
6	CSHH 238 (M)	30
7	CICR 2 (F)	35
8	CICR 2 (M)	30
9	CISA310	85
10	CISA614	100





## 11.4: Significant Decisions of IRC, IMC and Other Important Meetings

### 1. Research Advisory Committee Meeting

The Research Advisory Committee (RAC) of the Institute held its first meeting at CICR, Nagpur on April 24-25, 2009. Dr. S.S. Beghel, Ex. Vice-Chancellor, Assam Agricultural University, Jorhat, Chairman RAC presided over the meeting and guided the deliberations. Other members of RAC viz. Dr. S.K. Sharma, Ex. Project Director, Project Directorate of Cropping Systems, Modipuram, Dr. V. Shiva Reddy, Group Leader (Transformation) International Centre for Genetic Engineering & Biotechnology (ICGEB), New Delhi and Dr. G.T. Gujar, Head, Division of Entomology, Indian Agricultural Research Institute, New Delhi attended the meeting. Dr. K.R. Kranthi, Acting Director CICR, Nagpur, Dr. P.R. Bharambe, Head Crop Production Division, Dr. V.V. Singh, Head Crop Improvement Division, Dr. N. Gopalakrishnan, Project Coordinator (AICCP) and Head, CICR Regional Station, Coimbatore, Dr. D.Monga, Head CICR, Regional Station Sirsa and Sh. M.K. Meshram, Principal Scientist, Members Secretary were also present.



Dr. K.R. Kranthi, Director, CICR, Nagpur formally welcomed the RAC Chairman and its members. Dr. Kranthi presented an overview of current cotton situation. In his introductory remarks, Dr. Beghel, Chairman RAC appreciated the efforts made in the development of indigenous Bt genotype. Natural resources, especially water, he predicted, would be limiting in the days to come. He advised management of biotic stresses through cultural practices by understanding the life cycle of the pest. Dr. Shiva Reddy congratulated UAS, Dharwad, NRCPB, New Delhi, and CICR, Nagpur for their joint efforts in release of first public sector transgenic variety BN Bt.

The action taken report (ATR) on the recommendations of the previous Research Advisory Committee meeting held on August 3, 2007 was presented and discussed in detail. Dr. Kranthi highlighted the recent research initiatives and major research achievements of CICR, Nagpur and its regional stations. The Project Coordinator, Dr. N. Gopalakrishnan presented the achievements of the Regional Station, Coimbatore wherein the performance of high yielding interspecific hybrid CCHB 110, farming system approach, NAIP project and growing cotton under polymulch were highlighted. Dr. D.Monga, Head Regional Station Sirsa, presented the achievement of the station which includes release of CSHH 243, submission of CISA 614 for varietal identification and registration of 13 genetic stocks. Dr. V.V. Singh, Head Crop Improvement Division, Dr. P.R. Bharambe, Head, Division of Crop Production and Dr. K.R. Kranthi, Director and Head, Division of Crop Protection also presented research achievements of their respective divisions.

During the deliberations, Dr. Shiva Reddy desired that CICR should gear itself with reference to fibre specific genes and must ensure for the partnership in the cotton genome programme. Dr. Gujar expressed satisfaction with work being carried out by the plant protection group. Dr. Sharma desired that yield targets be fixed for rain-fed and irrigated cotton production system.

The Chairman Dr. Baghel, expressed satisfaction at the work being carried out and evinced need for a brain storming session on the challenges for cotton cultivation in North, South and Central India. He suggested for improvement in seed oil from cotton seed as by product, implementation of appropriate strategies for IRM through DOCD, Mumbai and identification of better combiners with agronomic parameters having good yield potential. Dr. Kranthi assured the house that all the valuable suggestions/recommendations will be implemented by improving the research programmes. He also assured the house that the seeds of BN Bt variety and Bt hybrid NHH 44 will be made available to the farmers through the Government agencies. The Director also expressed optimism on obtaining regulatory clearance for the commercialization of hybrid Bt NHH 44. The meeting concluded with a formal vote of thanks by the member secretary.

### 2. Institute Research Council Meeting

Institute Research Council Meeting was held on April 29-30, 2009 at CICR Nagpur under the Chairmanship of Dr. K.R. Kranthi, Director CICR. All the scientists of CICR, Nagpur participated and presented their research findings. The projects were discussed thoroughly and technical programme for the 2009-10 was finalized. The new research proposals were also presented, discussed and finalized to be implemented during 2010-11. IRC also felicitated Dr. VV Singh, Principal Scientist, Plant Breeding and Dr. P.M. Mukewar, Principal Scientist, Plant Pathology who were due for superannuation. The meeting was conducted by Dr. Vishlesh Nagrare, Secretary, IRC and Dr. Velmourougane, Jt. Secretary, IRC.

The annual IRC meeting of CICR, RS, Coimbatore was held on 10<sup>th</sup>-11<sup>th</sup> February 2010 under the Chairmanship of Dr. K. R. Kranthi, Director, CICR Nagpur. Dr. N. Gopalakrishnan, Project Coordinator and Head, CICR, RS Coimbatore made a brief introductory remark introducing the various activities and the overall contributions of scientists from various disciplines.

Dr. K. R. Kranthi, Chairman IRC, in his opening address desired that the research done at this center should fulfill the farmer's need of the region. He also sensitized the scientist regarding the relevance of the institute in the changing scenario of cotton cultivation at national and international level. He told to the house that hybrid era by private companies is at near saturation stage. In the present context of Bt era we need to find innovative avenues to deliver public goods. Leadership is required in solving problems. He congratulated the scientists of CICR RS Coimbatore on good work carried out on production aspects of cotton.

Dr. V. S. Nagrare, Secretary IRC welcomed Dr. K. R. Kranthi, Director, CICR Nagpur and Chairman IRC, Dr. P. R. Bharambe Head Division of Crop Production, Dr. P. K. Chakrabarty, Head Division of Crop Improvement, Dr. N. Gopalakrishnan PC & Head CICR RS Coimbatore and all the scientists. All the Scientists of the station presented the results obtained during 2009-10 and technical programmes for the year 2010-11 were approved by the house.

The annual IRC meeting of the regional station, Sirsa was held on 17<sup>th</sup> July, 2009. The meeting was Chaired by Dr. K. R. Kranthi, Director, CICR, Nagpur. Dr. D.Monga, Head CICR, Regional Station Sirsa welcomed the Director and appraised the house about the on-going research programmes at the station. All the Scientists of the station presented the results obtained during



2009-10 and technical programmes for the year 2010-11 were approved. Dr. P.R. Bharambe, Head Crop Production, Dr. V.V. Singh, Head Crop Improvement and Dr. V.S. Nagrare, Member Secretary, IRC were also present.

### 3. Institute Management Committee Meeting

The 47<sup>th</sup> Institute Management Committee of CICR, Nagpur was held on May 27, 2009 at CICR, Nagpur. Dr. K.R. Kranthi Acting Director CICR, Nagpur; Dr. O.P. Tuteja, Principal Scientist, CICR (RS), Sirsa; Dr. K.N. Gururajan, Principal Scientist, CICR (RS), Coimbatore; Dr. K.B. Hebbar, Principal Scientist, IISS, Bhopal; Dr. (Mrs.) Vinta Gotmade, Sr. Scientist, CICR, Nagpur; Dr. Nandini Gokte-Narkhedkar, J/c. Admn. Officer CICR attended the meeting. Other special invitees were Dr. S.N. Puri, Hon'ble V.C. Central Agricultural University (CAU), Imphal & Chairman, QRT; Dr. N. Gopalakrishnan, PC & Head Regional Station, Coimbatore, Dr. D.Monga Regional Station, Sirsa, Dr. P.R. Bharambe, Head Crop Production Division CICR, Nagpur, Dr. R. K. Deshmukh, J/c HOD, Crop Improvement, CICR Nagpur; Shri M.K. Meshram, Scientist Incharge, KVK, Nagpur and Shri Devesh Nigam, Finance & Account officer.

At the outset Dr. P.R. Bharambe, Head Division of Crop Production welcomed the Director, CICR and Chairman, IMC, Dr. S.N. Puri and other Hon'ble members of IMC. He also mentioned that this session was specially convened to facilitate the presentation of the recommendations of QRT. Director, CICR briefly outlined the recent R & O achievements of the Institute. He highlighted the release of two Bt transgenic cotton from public sector viz., BN Bt *hirsutum* variety and NHH 44 Intra *hirsutum* hybrid as major achievements. Dr. S.N. Puri, Hon'ble VC, CAU, Imphal and Chairman QRT, CICR Nagpur at the outset complimented the research of CICR and AICCIP for the excellent work carried out during the review period. He expressed that the main concern of QRT was regarding the introduction of public sector transgenic into the market. The main recommendations of the QRT pertaining to CICR and AICCIP were also discussed. The meeting ended with thanks to Chair and the members by the Members Secretary.

### 4. Brain storming cotton: facing the new challenges

Brain Storming Cotton on facing the new challenges was held on July 9, 2009 at Central Institute for Cotton Research, Nagpur. The meeting comprised of two sessions. The first session comprised of Background papers and was chaired by Dr. C.D.

Mayee, Chairman, ASRB, New Delhi. The second session was chaired by Dr. Swapan Datta, Deputy Director General (Crop Sciences) and it comprised of views on researchable issues on emerging challenges. These views were compiled from the feedback received from different cotton researchers in India (through e-mail). Dr. C.D. Mayee delivered a talk on 'Cotton- the recent revolution and issues'. He observed that precision farming is the next challenge which should aim at a productivity of 35 q. per hectare. He desired that CICR should take the lead and demonstrate the feasibility of precision farming on a model plot.



Dr. S. Sreenivasan, Director, CIRCOT, Mumbai gave a talk on 'Cotton trade, demand, pricing & quality issues after the introduction of Bt cotton. The recent challenges and ways to tackle them'. Dr. Sreenivasan presented the requirements for cotton of different fibre span lengths based on the feedback from textile industry. He also informed that very few Bt cotton cultivars satisfy the quality norms set by the industry. He also regretted that in 2007 *hirsutum* cotton in 28-32 mm length dominated the production and the production of other three types of cotton obtained from *arborescens*, *herbaceum* and *barbadense* were low. The other issues raised by him related to reduction in micronaire in Bt cotton after second picking only resulting poor quality cotton and mixing of Bt with non-Bt inorganic cotton meant for export. Dr. Sreenivasan presented a futuristic picture of cotton with ideal attributes such as tenacity and extension of polyester, softness of wool, less short fibre content and improvement of GOT.

In the second session on Cotton: Facing the new challenges was chaired by Hon'ble DOG (CS), Dr. Swapan Datta. Dr. P. K. Chakrabarty and Dr. Gopalakrishnan presented some of the issues based on the views received from various cotton workers around the country. Pertinent concerns in cotton biotechnology and breeding were:

Gene construct and future biotech products: How should India deal with IPR?

497 Bt hybrids and more to come, 90% area covered by private Bt cotton hybrids: What are the options left for public sector breeders?

- Bt cotton hybrids: Are they more susceptible?
- Roundup Ready Cotton: Issues on suitability for Indian cropping systems.
- Seed quality, market trade, export and quality issues.

Responding to these issues there was a general observation that there is substantial increase in yield since 2002. An attempt should be made to analyse the Bt hybrids spread in India and quantify the role of Bt gene per se in bringing about of this increase in yield. There is a general observation that only a few hybrids have contributed towards yield growth.

Another issue of concern was whether in addition to Bollgard-I, should we recommend Bollgard-II also since in areas of North zone where diversification is less.

The house arrived at the consensus that public sector institute like CICR must take a lead and concentrate on creation of genetic variability and develop robust parental lines or varieties. There was a need to identify best Bt hybrid for each zone for cultivation. DOG suggested to select only those genotypes with morphological traits that are acceptable to farmers and industry. Roundup Ready issue needs to be discussed cautiously taking the entire cotton based system into account.

Dr. M. V. Venugopalan and Dr. Sandhya Kranthi presented the issues compiled from various emerging problems. Some of the issues raised were:

Melaybugs, Mirid bugs, new emerging pest and diseases: How to prevent resurgences and remedies. Mealy bugs, Mirid bugs, new emerging pests and diseases may best be controlled by good management practices.

Sucking pest resistance to insecticides: The problem and management options.

Bollworm resistance to Cry toxins: Status, trends and management option for India. Refugia option for Bollgard-II.

Leaf reddening and wilt: Causes, consequences and remedies.

Gearing up for Climate change will cotton benefit and how to cope up with it.

Reacting to the deliberations Hon'ble DOG was of the opinion that Bt is a valuable technology and should be nurtured with care.



mismanaged to avoid a breakdown.

Gene pyramiding without disturbing the basic genome should be taken up to tackle multiple problems.

Screening of genotypes/ available material will help in getting the resistant genotypes.

Causes of leaf reddening, its physiological and nutrient interaction were discussed at length. Strategies to overcome leaf reddening and para wilt should be developed and it should be ensured that the susceptible lines are not used in breeding programme.

### 11.5: Workshops/Farmer's Day Organized

### 11.6. Distinguished visitors

### Farmers meet

Farmers meet was organized in collaborations with Ramkrishna Bajaj Krishi Mahavidyalaya on 9<sup>th</sup> March 2010 at Rural Institute Hall, Ramkrishna Bajaj Krishi Mahavidyalaya, Pipri, Wardha. The programme was organized in order to disseminate crop production technologies for ensuing season, to discuss with growers all aspects related to appropriate utilization of the technologies to enhance productivity under rainfed conditions and popularize benefits of CICR technologies to reduce cost of cultivation

Name & Designation	Organisation	Date
<b>Nagpur</b>		
Dr. S.S. Baghel <sup>1</sup> , Chairman, RAC & Ex Vice Chancellor	Assam Agricultural University, Jorhat	24 April, 2009
Dr. V. Shiva Reddy, Group Leader (Transformation)	International Centre for Genetic Engineerings Biotechnology (ICGEB), New Delhi	25 April, 2009
Dr. S. N. Puri, Chairman, QRT & Vice-Chancellor	Central Agricultural University, Imphal	27 May, 2009
Dr. Swapan Kumar Datta Deputy Director General (CS)	Indian Council of Agricultural Research, New Delhi	9 July, 2009
Dr. C. D. Mayee, Chairman	ASRB, New Delhi	9 July, 2009
Dr. S. Sreenivasan, Director	CIRCOT, Mumbai	9 July, 2009
Dr. Albertino Jeronimo, Inspector General	Ministry of Agricultural, Mozambique	12 Nov., 2009
Cossa LRC Head of Department	Mozambique Institute of Cotton	12 Nov., 2009
Hope Ruhindi Mwesigys Hon'ble Minister of Agricultural, Animal Industry of Fisheries	Uganda Government	21Dec., 2009
<b>Coimbatore</b>		
Dr. Mangala Rai Secretary, DARE & Director General	Indian Council of Agricultural Research, New Delhi	6 Nov., 2009
<b>Sirsa</b>		
Dr. Stephen Wambula Muliokela, Executive Director	Golden Valley Agricultural Trust (GART), Zambia	7 Oct., 2009
Mr. Namukototo Mukutu, Chairman, Mr Barry Coxe Member	Board of Trustees, GART, Zambia	
Mr Douglass Moono, Head	Research & Development, GART	
Prof. G. S. Pandey,	Dairy Development, GART	
Dr, T,P. Rajenderan ADG (PP)	ICAR, Krishi Bhawan, New Delhi	8 Oct., 2009



## 11.7 : Participation of scientists in Seminars/ Symposia/ Workshops

Sr. No.	Seminars/Conferences /Symposia/ Workshops/Training	Place and Date	Participants
1.	ICAR Zonal Technology Management and Business Planning and Development	Nagpur 5-6 March, 2009	Dr. P. R. Barambe Dr. MV Venugopalan, Dr. AR Reddy, Er. G. Majumdar
2.	Workshop on formulation of project on Awareness-cum-Surveillance Programme for Management of Major Pests in Soybean-Cotton Based Cropping System in Maharashtra	Nagpur 1 April, 2009	Dr. V.S. Nagrare
3.	Annual Workshop of All India Coordinated Cotton Improvement Project (2008-09)	Hyderabad 6-8 April, 2009	Dr. K.R., Kranthi, Dr A H Prakash Dr. MV Venugopalan Dr. SM Wasnik, Dr. AR Reddy Dr N. Gopalakrishnan Dr. T. Surulivelu, Dr S. Manickam Mr M. Sabesh, Dr S. Ushar Rani
4.	International Conference on Emerging Trends in Production, Processing and Utilization of Natural Fibres	Mumbai 16-18 April, 2009	Dr. K.R., Kranthi, Dr.C.S.Praharaj Dr. N. Gopalakrishnan Dr. P. Nalayini, Dr. D. Monga Dr. K. Shankaranarayanan
5.	Sub committee GEAC meeting	New Delhi, 17 April, 2009	Dr. K.R., Kranthi
6.	Brain Storming Session of development of cotton picker	Noida, 3 June, 2009	Dr. K.R., Kranthi
7.	NAIP (DSS 2046) CMU and CIC meeting	Hyderabad, 6 June, 2009	Dr. V.S. Nagrare
8.	Meeting of ZREAC of Central Vidarbha Region	Yeotmal 19 June, 2009	M.K. Meshram
9.	Workshop on formulation of project on Awareness-cum-Surveillance Programme for Management of Major Pests in Soybean-Cotton Based Cropping System in Maharashtra	Pune 19-20 June, 2009 and 1 August, 2009	Dr. V.S. Nagrare
10.	9th Agricultural Science Congress on technological and Institutional Innovations for Enhancing agricultural Income	Srinagar June 22-24, 2009	Dr P. Nalayini, Dr S. Manickam Dr A.H. Prakash
11.	Director's Conference	New Delhi 16 July, 2009	Dr. K.R., Kranthi
12.	Rural Programme Advisory Committee meeting	Akola, 25 Aug., 2009	M.K. Meshram, Dr. S.M. Wasnik
13.	ICAR Governing Body meeting	New Delhi, 27 Aug., 2009	Dr. K.R., Kranthi
14.	Cotton Advisory Board meeting	New Delhi 29 Aug., 2009	Dr. K.R. Kranthi
15.	Seminar on IPR, PPV&FR and Biological Diversity acts	Coimbatore 4 September, 2009	Dr K. Rathinavel
16.	Workshop on Resistance Management for Bt Cotton	New Delhi 22 September, 2009	Dr. K.R. Kranthi
17.	Workshop on "Role of media in agriculture extension"	Akola, 23 Sep., 2009	M.K. Meshram
18.	Meeting of ZREAC of Central Vidarbha Region	Yeotmal, 8 Oct., 2009.	M.K. Meshram
19.	Meeting on issues relating to WHO Doha negotiations	New Delhi 26 Oct., 2009	Dr. K.R., Kranthi
20.	31st Annual Conference and Symposium on Microbial wealth-Plant health	Siliguri 23-25 October, 2009	Dr. P.K.Chakrabarty
21.	AZRA, 2009 - "National Conference on Biodiversity Conservation and Management of Bio-resources"	Visakhapatnam 28-29 October, 2009	Dr. J.Gulsar Banu
22.	"Cotton Stakeholders' Workshop to Probe Challenges and Opportunities for Cotton in TamilNadu" in collaboration with the Indian Institute of Technology, Chennai	Coimbatore 2 November, 2009	Dr N. Gopalakrishnan Mr M Sabesh Dr K. Shankaranarayanan Dr S. Usha Rani
23.	IV National Conference on Krishi Vigyan KEmdras	Coimbatore, 6-8 Nov., 09	M.K. Meshram
24.	5th International conference on Plant Pathology	New Delhi, 10-13 Nov., 09	Dr. D. Monga Dr. P.K.Chakrabarty
25.	Steering committee meeting.	Rahuri, 11 Nov., 2009	Dr. V.S. Nagrare



26. 7th Pacific Rim Conference on "Biotechnology of Bacillus thuringiensis and its environmental impact"	New Delhi 25-28 Nov., 2009	Dr. B. Dharajothi Dr S. Manickam Dr. G. Balasubramani Dr. J Amudha, Dr. V. Santhy
27. Rural Programme Advisory Committee Meeting	Amravati, 26 Nov., 2009	M.K. Meshram
28. 2nd Bio-pesticide International Conference.	Palayamkottai 26-28 November,2009	Dr. J.Gulsar Banu
29. Meeting on Mealybug.	Bangalore, 5-6 Dec.,09	Dr. V.S. Nagrare
30. National Symposium on Recent Global Developments in the Management of Plant Genetic Resources	New Delhi 17-18 December, 2009	Dr. R,A Meena Dr. A,B Dongre, DrV Gotmare Dr. Punit Mohan
31. Quarterly Meeting for Agricultural Advisory Committee for finalization of Programmes of All India Radio	Katol 9 February, 2010	Dr. S.M. Wasnik
32. NAIP (DSS 2046) CMU and CIC meeting	Hyderabad, 15 Feb.,10	Dr. V.S. Nagrare
33. National Conference on Plant Protection in Agriculture through Eco-friendly Techniques & Traditional farming Practices	Jaipur 18-20 February ,2010	Dr. Rishi Kumar
34. National Seed Science Congress	New Delhi, 18-20 Jan.10	Dr. V. Santhy
35. National Seminar on Biotechnology for Agriculture, Health, Industry and Environment	Nagpur 20 - 21 February, 2010	Dr. S.B. Nandeshwar
36. Interface on Optimal Land Use and Water Management	Nagpur 22-23 February, 2010	Dr. MV Venugopalan
37. National conference on Innovations in Nematological Research for Agriculture sustainability - Challenges and a road map ahead.	Coimbatore 23-25 February,201 0	Dr.J.Gulsar Banu
38. Network project proposals on Comprehensive Utilization of Natural Fibres: Production, Processing and By-Product Utilization	New Delhi 25 February,2010	Dr. MV Venugopalan
41. Conference on Conservation tillage and Technology Conference	Ada, Ohio, USA 25-26 February, 2010	Dr K.K. Bandyopadhyay
42. Indo-US Bilateral Workshop	Hisar, 25-27 Feb., 2010	Dr. P.K.Chakrabarty
43. National Seminar on Post harvest management of seed for quality assurance and farmers prosperity	Kamal 26-27 February, 2010.	Dr. R,K Deshmukh
44. National Seminar on "Soil security for sustainable Agriculture"	Nagpur 28 Feb., 2010	M.K. Meshram
45. ZTM-BPD meeting cum workshop	Nagpur, 5-6 Mar.,10	Dr. MV Venugopalan
46. NAIP (DSS 2046) Annual review meeting	New Delhi, 5-6 Mar.,10	Dr. V.S. Nagrare
47. Conference on "Carbon Sequestration in Urban Ecosystems Symposium"	Ohio, USA 4 April, 2010	Dr K.K. Bandyopadhyay



## 11.8 Personnel

Name of the Officers/Scientists	Designation	
K R Kranthi (Acting Director upto 14.02.10)	Director (w.e.f. 15.02.2010)	
<b>PROJECT COORDINATOR (Cotton)</b>		
<b>Coimbatore</b>		
N Gopalakrishnan	P.C. (Cotton) & Head	
<b>PLANT BREEDING</b>		
<b>Nagpur</b>		
V V Singh (Retd. 31.08.09)	Principal Scientist	
Smt., S B Singh	Principal Scientist	
T R Loknathan	Principal Scientist	
S M Palve	Principal Scientist	
V N Waghmare	Senior Scientist	
<b>Coimbatore</b>		
K N Gururajan	Principal Scientist	
<b>Sirsa</b>		
S L Ahuja	Principal Scientist	
O PTuteja	Principal Scientist	
S K Verma	Senior Scientist	
<b>GENETICS &amp; CYTOGENETICS</b>		
<b>Nagpur</b>		
S B Nandeshwar	Principal Scientist	
Smt., Vinita Gotmare	Senior Scientist	
<b>Coimbatore</b>		
Smt., K P M Damayanthi	Senior Scientist	
S Manickam	Senior Scientist	
<b>SEED TECHNOLOGY</b>		
<b>Nagpur</b>		
R K Deshmukh	Principal Scientist	
Smt., P R Vijayakumari	Senior Scientist	
Smt., V Santhy	Scientist(ss)	
<b>Coimbatore</b>		
K Rathniveel	Principal Scientist	
<b>Sirsa</b>		
RAMeena	Principal Scientist	
<b>ECONOMIC BOTANY</b>		
<b>Nagpur</b>		
Punit Mohan	Principal Scientist	
<b>AGRONOMY</b>		
<b>Nagpur</b>		
PR Barambe	HOD (Crop Production) Principal Scientist Senior Scientist	
<b>Coimbatore</b>		
MV Venugopalan		
AR Raju		
<b>Coimbatore</b>		
C S Praharaaj (Trd. to IIPR - 11.2.2010)	Senior Scientist	
K Shankaranarayanan	Senior Scientist	
Smt P Nalayani	Senior Scientist	
<b>SOIL SCIENCE</b>		
<b>Nagpur</b>		
Jagvir Singh	Principal Scientist	
<b>Coimbatore</b>		
K K Bandyopadhyay	Senior Scientist	
Smt., TP Swarnam (Trd. to CARI- 23.9.09)	Scientist (SS)	
<b>AGRICULTURAL ENGINEERING</b>		
G Majumdar	Scientist (SG)	
<b>PLANT PATHOLOGY</b>		
<b>Nagpur</b>		
P M Mukewar (Retd. 30.06.09)	Principal Scientist	
M K Meshram	Principal Scientist	
R C Ukey	Principal Scientist	
AK Mukherjee (Joined on 20.7.09)	Senior Scientist	
SJ Gawande (Trd. to NRCOG 31.12.09)	Scientist (SS)	
<b>Coimbatore</b>		
M Gunasekharan V Jayakumar (Trd. to SSI - 03.06.09)	Senior Scientist	
<b>Sirsa</b>		
Dilip Monga		Head of Station
<b>ENTOMOLOGY</b>		
<b>Nagpur</b>		
K R Kranthi (Director w.e.f. 15.2.10)		HOD (Crop Pro!.)
Smt., S Kranthi		Principal Scientist
Smt., S Vennila (Trd. to NCIPM - 7.5.09)		Senior Scientist
K Rameash (Joined 23.7.09, Trd. NBPGR-RS on 29.12.09)		Scientist (SS)
VS Nagrare		Scientist (SS)
Chinna Babu Naik V (Joined 15.3.10)		Scientist
<b>Coimbatore</b>		
T Surulivelu		Principal Scientist
K Natarajan		Principal Scientist
Smt., B Dhara Jothi		Senior Scientist
Smt M Amutha		Scientist
<b>Sirsa</b>		
Rishi Kumar		Senior Scientist
<b>NEMATODOLOGY</b>		
<b>Nagpur</b>		
Smt., Nandini Narkhedkar		Principal Scientist
<b>Coimbatore</b>		
Smt., J Gulsar Banu		Senior Scientist
<b>PLANT PHYSIOLOGY</b>		
<b>Nagpur</b>		
A H Prakash (joined on 01.02.2010)		Principal Scientist
<b>Coimbatore</b>		
AH Prakash (up to 31.01.2010)		Senior Scientist
S E SA Khader		Principal Scientist
<b>BIOCHEMISTRY (PS)</b>		
<b>Nagpur</b>		
AS Dongre		Principal Scientist
Smt., M. Chakrabarty		Scientist (SG)
<b>BIOTECHNOLOGY</b>		
<b>Nagpur</b>		
P K Chakrabarty (HOD w.e.f. 21.8.09)		HOD, Crop Improvement Senior Scientist
G Balasubramani		Senior Scientist
Smt., J Amudha		Senior Scientist
Smt S. Choudhary (Trd. to NRCSS- 29.01.10)		Scientist
KP Raghavendra (Joined on 19.6.09)		Scientist
<b>MICROBIOLOGY (PS)</b>		
<b>Nagpur</b>		
K Velmourougane		Scientist
<b>AGRICULTURE EXTENSION</b>		
<b>Nagpur</b>		
S M Wasnik		Principal Scientist
<b>Coimbatore</b>		
Usha Rani		Scientist (SS)
<b>AGRICULTURAL ECONOMICS</b>		
<b>Nagpur</b>		
P R Deoghare (Retd. on 31.3.10)		Principal Scientist
AR Reddy		Senior Scientist
<b>Coimbatore</b>		
Smt., Isabella Agarwal		Senior Scientist
<b>COMPUTER APPLICATION</b>		
<b>Coimbatore</b>		
M Sabesh		Scientist (SS)
<b>KVK</b>		
<b>Nagpur</b>		
S N Rokade		Principal Scientist
MS Murthy		Administrative Officer
Devesh Nigam (Relieved on 31.3.2010)		FACO



## 11.9. OTHER INFORMATION

### Foreign delegations Visit to CICR

#### Nagpur

##### Uganda delegation

A high level delegation from Uganda led by Hon'ble Hope Ruhindi Mwesigys, Minister of Agriculture, Animal Industry & Fisheries along with Chairman and Members of Parliament and delegates of Cotton Development Organization visited CICR, Nagpur on Dec.21, 2009. The delegation visited important laboratories and fields at CICR, Nagpur. The delegation also interacted with scientists of CICR at an interactive meeting where views and information regarding cotton production in the two countries were exchanged.

##### Mozambique delegation

A delegation led by Cossa IRC, Head of Department, Mozambique Institute for Cotton and Dr. Albertino Jeronimo, Inspector General, Ministry of Agriculture, Mozambique visited CICR, Nagpur on 12-13 November 2009. The delegation visited important laboratories and fields. The delegation also made a visit to the IRM villages of Wardha and Yavatmal district and interacted with Shri Atul Sharma, District IRM coordinator and farmers regarding implementation of the IRM programme on large scale and farmers' perception regarding IRM.



#### Sirsa

##### Zambian delegation

A Zambian delegation headed by Dr. Stephen Wambula Muliokela, Executive Director, Golden Valley Agricultural Trust (GART), Zambia visited CICR Regional Station, Sirsa on Oct.7, 2009. The delegation comprised of Mr. Namukototo Mukutu, Chairman, Board of Trustees, GART, Mr Barry Coxe Member, Board of Trustees, Mr Douglass Moono, Head Research & Development and Prof. G. S. Pandey, Dairy Development, GART. The delegation had a discussion with the scientists of this station on cotton cultivation and package of practices being followed in North Zone. Dr.D. Monga, Head, made presentation on cotton scenario in India and the delegation showed interest on Bt cotton cultivation and biosafety measures followed in India as Zambia is facing the difficulty in export of lint to European countries. The delegation also visited the Sharada Cotton

Ginning factory and showed keen interest on seed cotton ginning, pressing of bales and oil extraction unit., Dr. H. D. Yadav, Director Extension from CCS HAU, Hisar and Dr. B.S. Sheokand, Senior coordinator, KVK, Sirsa also accompanied the delegation and took part in deliberation along with Scientists of CICR Regional Station, Sirsa.

#### Library

##### Additions

In the period from 2009-10, the Library purchased 173 new books and subscribed to 20 foreign journals and 27 Indian journals. In the said period the Library also purchased 71 Hindi books.

##### Documentation Services Library Networking

- As regards the CD-ROM Workstation, the current version of CROP SCIENCE DATABASE CD was purchased and uploaded in the IAN Server and thereby AGRIS, AGRICOLA, BIOTECHNOLOGY ABSTRACTS, CABABSTRACTS AND CROP CD are visible and accessible in the Institute Network. These CDs range from the period 1970-2010.
- Library has developed computerized bibliographic database on Cotton to provide comprehensive and updated information on cotton. About 3732 bibliographic references along with abstracts have been stored in it. Based on this bibliographic database the Library publishes a current awareness bulletin namely "COTTON RESEARCH ABSTRACTS". The Bulletin is circulated to all the scientists of the Institute and to all AICCP Centers in India. In the reported period, four issues of COTTON RESEARCH ABSTRACTS (V23, (No. 1-4), January December 2009) were published and circulated.
- The Library is actively participating in the E-Journal Consortium by responding regularly through E-mails and thus also receiving updates. More than 2000 on-line journals on agriculture and crop science are made available over the network through this consortium.
- Four User Terminals installed in the Library have facilitated the library users to access the databases uploaded in the Library Server. Users can also access the Internet on these terminals. Similarly the entire catalog of the library has been downloaded on these terminals for ease of use.
- The WebOPAC version of the Library software SLIM21 was updated and by using this Library Application Software, the entire catalogue of holdings of the Library (books and bound volumes) is available on all terminals within the Institute.





## Progressive Use of Hindi

### Nagpur

#### OUN Meeting & Quarterly Report

- Official Language Implementation Committee (OLIC) of CICR working under the chairmanship of the Director, CICR met regularly. Proceedings of the meeting were sent to the Council.
- Quarterly progress reports regarding the use of Official Language in Hindi in the institute were sent to the Council regularly.

#### Hindi Day

- CICR celebrated Hindi day as Hindi Chetna Fortnight during 14-29 Sept., 2009 at the institute's headquarter Nagpur. Various programmes and competitions like, hand writing, dictation, words meaning, sandhi-vichched, slogan, idioms, memory, noting & drafting, letter-writing, question-answer, maximum official work in hindi, maximum published technical & popular articles in agriculture, etc. were organized during this fortnight. The winners were awarded prizes during the prize distribution function held on 29<sup>th</sup> Sept., 2009. Ex-Director of CICR, Dr. M.S. Kairon as Chief Guest and Acting Director CICR Dr. K.R. Kranthi addressed at this occasion.
- Hindi Week was celebrated at institute's regional stations Coimbatore and Sirsa and wherein various programmes and competitions were organized this week and the winners were awarded.
- At Nagpur Dr. S.N. Rokade (Sr. Scientist) awarded 1<sup>st</sup> prize, Dr. U.v., Galkate (S.M.S. of KVK) 2<sup>nd</sup> prize and Dr. M.V. Venugopalan (Principal Scientist) 3<sup>rd</sup> prize for publishing maximum technical articles in agriculture in Hindi.
- For doing maximum official work in Hindi during the year Shri. Ashok Belsare awarded 1<sup>st</sup> prize, Shri. Prakash Mishra 2<sup>nd</sup> prize and Shri. Ramchandra Varchhaye 3<sup>rd</sup> prize.
- Two extension folders Bt cotton variety BN Bt and Bt hybrid NHH-44 Bt were prepared in Hindi.

### Coimbatore

- The Official Language Implementation is being effectively carried out at CICR, Regional Station, Coimbatore. In this Institute, Hindi Workshops are regularly organized as per the Official Language Policies to promote the Hindi usage in official activities for the staff members. The Hindi

Teaching Scheme, Coimbatore, Ministry of Home Affairs, Government of India had organized the Prabodh and Praveen classes for Scientists and Staff members to



acquire Hindi Training. A one day Hindi seminar was organized by Sugar Cane Breeding Institute on 30.7.2009 on "Climate Change". A paper was presented by Project Coordinator and Head on Climate Change in this seminar.

- In the month of September 2009, Hindi day was organized at CICR, Coimbatore. Various Competitions were held for scientists and staff towards Hindi Day celebrations and prizes were distributed on Hindi Day. The Town Official Language Implementation Committee had organized a one day Hindi Singing competitions in view of Hindi Day celebrations. Various staff members from Central Government Offices participated in these competitions and won prizes.
- The Town Official Language Implementation Committee has awarded third prize to CICR, Coimbatore in Hindi Implementation for the year 2008-09. The project Coordinator & Head received the award in the half yearly Meet of Town Official Language Implementation Committee in December 2009. The Official Language Implementation Committee Meeting is being regularly organized at CICR, Coimbatore to discuss various issues on Development and Implementation of Official Language as per the Official Language Policy. The Hindi Cell and the Official Language Implementation Committee of this Institute are working towards achieving the progressive use of Hindi at the Institute.





## 11.10: WEATHER

### Nagpur

Month	Temperature (OC)		Relative Humidity (%)		Rainfall (mm)	No. of Rainy Days
	Max.	Min.	Max.	Min.		
June, 2009	40.7	27.1	53	33	281	15
July, 2009	30.2	24.4	87	72	324	18
August, 2009	31.8	24.9	86	65	228	11
September, 2009	34.2	24.4	85	57	67	4
October, 2009	33.3	20.6	77	40	40	4
November, 2009	29.2	16.6	83	62	27	4
December, 2009	29.3	14.4	80	41	7	1
January, 2010	28.9	11.3	70	28	0	0
February, 2010	33.7	16.8	61	22	0	0
<b>Total</b>					<b>974</b>	<b>57</b>

### Coimbatore

Month	Temperature (OC)		Relative Humidity (%)		Rainfall (mm)	No. of Rainy days (>2.5 mm)
	Max.	Min.	Max.	Min.		
April, 2009	35.6	24.0	83.3	39.2	0	0
May, 2009	34.8	23.8	86.6	46.8	114.6	6
June, 2009	32.1	23.7	79.6	50.7	11.2	1
July, 2009	29.7	22.9	81.9	61.3	87.2	10
August, 2009	31.6	22.9	86.2	54.3	38.8	3
September, 2009	31.5	23.0	88.2	59.1	108.6	7
October, 2009	31.6	21.8	86.7	49.2	115.8	5
November, 2009	29.2	22.3	93.3	65.5	250.6	11
December, 2009	29.0	21.3	88.4	57.4	2.8	0
January, 2010	30.5	20.2	87.6	45.1	0	0
February, 2010	32.9	20.5	85.2	36.0	0	0
March, 2010	35.6	22.2	79.6	25.5	0	0
<b>Total</b>					<b>729.6</b>	<b>43</b>

### Sirsa

Month	Temperature (OC)		Relative Humidity (%)		Rainfall (mm)	Rainy Days
	Max.	Min.	Max.	Min.		
April, 2009	37.1	20.3	44.6	31.6	34.4	2
May, 2009	41.2	26.2	43.5	29.5	0	-
June, 2009	42.4	27.5	42.0	33.0	12.2	2
July, 2009	37.2	28.6	70.4	50.8	1.0	1
August, 2009	36.8	28.0	75.3	54.3	15.4	5
September, 2009	34.2	24.3	81.8	52.8	44.7	3
October, 2009	33.5	17.2	72.0	30.6	-	-
November, 2009	26.2	10.2	80.3	34.3	-	-
December, 2009	23.1	6.7	78.0	33.0	1.0	1
<b>Total</b>					<b>108.7</b>	<b>14</b>

### 11.11: Cotton Scenario

Cotton is one of the principal crops of India and plays a vital role in the country's economic growth by providing substantial employment and making significant contributions to export earnings. The cotton cultivation sector not only engages around 6 million farmers. In 2008, the textile sector contributed about 14% of industrial production, 4% of the GDP and provided direct employment to over 33 million people. The textile sector is the second largest provider of employment after agriculture.

According to USDA, the global cotton output in 2009-10 is expected to be lower at 22.69 million tonnes due to lower acreage in major producing countries. There was a 4.4% decrease in production relative to 2008-09. China is the largest producer of cotton in the world and contributing to one-third of the total global output. India and USA are other major producers and together contribute to 37% of the total global production. The other major cotton producing countries are Pakistan (7%), Brazil (6%), Uzbekistan (4%), and Turkey (3%). India's contribution in export of cotton was 80 lakh bales during 2009-10.

Due to the reduction in cotton production in the world and increase in world cotton consumption have resulted in expectations of an 11.8 million bale production/consumption gap in 2009/10 which represents 11.5% of production, 10.3% of consumption, and 22.7% of ending stocks. The production/consumption gap may impact on prices at the country level this may impact on trade patterns. China's production in 2009-10 was 14.2% lower than in 2008-09 whereas the Chinese consumption is anticipated to increase

3.9%. Hence it is expected that China will import almost 2 million more bales in 2009-10 (9.0 million) than in 2008-09.

Cultivated Bt cotton in 8.381 million hectares in 2009 which is equivalent to 83% of 10.152 million hectares under cotton. In 2009, for the first time, multiple gene Bt cotton occupied more areas (57%) than single gene Bt cotton (43%). Again 2009, was the first year for an indigenous public sector bred Bt cotton variety (*Bikaneri Nerma*) and a Bt hybrid (NHH 44 Bt) were commercially available.

In 2009-10, the highest cotton producing state in India is Gujarat (95 lakh bales with productivity 615 kg/ha), followed by Maharashtra (67 lakh bales with productivity 325 kg/ha). About 70% of total cotton is produced in Gujarat, Maharashtra and Andhra Pradesh from the area of 73%. Area in North zone, Central zone and South zone are 15.00, 67.73 and 18.01 lakh ha, respectively and contributions in production are 13%, 61% and 21% respectively during 2009-10. At a national level, the cotton yields in India have declined to 488 kg/ha during 2009-10 from 524 kg/ha in 2008-09.

India is the only country to grow all four species of cultivated cotton besides different combinations of hybrid. The majority of the cotton in India is grown in nine states which are grouped into three different zones namely, Northern zone (Punjab, Haryana and Rajasthan), Central zone (Maharashtra, Madhya Pradesh and Gujarat) and Southern zone (Andhra Pradesh, Karnataka and Tamil Nadu). Approximately 65% of India's cotton is produced under rainfed condition and 35% on irrigated conditions. Details of cotton scenario (2009-10) are given in Table 1 and 2.

**Table 1: Cotton Growing Zones in India**

Zones	North Zone	Central Zone	South Zone
States	Punjab, Harayana, Rajasthan	Maharashtra, Madhya Pradesh, Gujarat	Andhra Pradesh, Karnataka, Tamil Nadu
Area (million ha )	1.447	6.773	1.850
Production (million bales)	4.00	17.35	6.45
Productivity (kg/ha )	470	435	593
Conditions	100% irrigated	Irrigated and rainfed	Irrigated and rainfed
Soil Type	Alluvial soils	Black cotton soils	Black soils and Red soils
Nature of Genotype	Hybrids and varieties	Hybrids and varieties	Hybrids and varieties
Species Hybrids	<i>G. hirsutum</i> , <i>G. arboreum</i> intra <i>hirsutum</i>	<i>G. hirsutum</i> , <i>G. arboreum</i> , <i>G. herbaceum</i> <i>G. barbadence</i> , Intra <i>hirsutum</i> ,	<i>G. hirsutum</i> , <i>G. arboreum</i> , <i>G. herbaceum</i> , Interspecific tetraploids(HB)
Insect/ Pest	Heliothis, Whitefly, Jassids, Pink bollworm, Mealy bug	Heliothis, Whitefly, Jassids, Aphids, Pink bollworm Mealy bug	Heliothis, Whitefly, Jassids, Aphids, Pink bollworm
Diseases/physiological disorder	Leaf curl virus, Wilt	Wilt, leaf reddening	Wilt, Foliar disease
Sowing Method	Drill Sown	Hand dibbling	Hand dibbling
Time of Sowing	April-June	June-July	July-Sept





**Table 2: State-Wise Cotton Area, Production and Productivity**

Zone/State	2008-2009			2009-2010		
	Area (Lakh ha)	Prod. (Lakh bales)	P (kg/ha)	Area (Lakh ha)	Prod. (Lakh bales)	P (kg/ha)
Punjab	5.27	17.50	565	04.96	14.25	488
Haryana	4.56	14.00	522	05.07	14.75	495
Rajasthan	3.02	7.50	422	04.44	11.00	421
<b>North Zone</b>	<b>12.85</b>	<b>39.00</b>	<b>516</b>	<b>14.47</b>	<b>40.00</b>	<b>470</b>
Gujarat	23.54	90.00	650	26.24	98.00	635
Maharashtra	31.42	62.00	335	35.03	61.00	296
Madhya Pradesh	6.25	18.00	490	06.46	14.50	382
<b>Central Zone</b>	<b>61.21</b>	<b>170.00</b>	<b>472</b>	<b>67.73</b>	<b>173.50</b>	<b>435</b>
Andhra Pradesh	13.99	53.00	644	13.19	50.00	644
Karnataka	04.08	9.00	375	04.27	09.50	378
Tamil Nadu	01.09	5.00	780	01.04	05.00	817
<b>South Zone</b>	<b>19.66</b>	<b>67.00</b>	<b>594</b>	<b>18.50</b>	<b>64.50</b>	<b>593</b>
Others	0.84	2.00	405	1.01	2.00	337
<b>Total</b>	<b>94.06</b>	<b>278.00</b>	<b>502</b>	<b>101.71</b>		
Loose cotton consumed but not counted for in State-wise prod.		12.00			12.00	
<b>Grand Total</b>	<b>94.06</b>	<b>290.00</b>	<b>524</b>	<b>101.71</b>	<b>292.00</b>	<b>488</b>

Prod. = Production

P = Productivity

1 bale= 170 kg.

Source: Office of the Textile Commissioner, Mumbai.







Cotton is one of the most important crops in the world. It is used to make clothes and other things. Cotton is a soft plant that grows in warm climates. It has long, thin leaves and small white flowers. The cotton bolls are the fruit of the plant, and they contain the cotton fibers. Cotton is harvested by hand or by machine. The cotton fibers are then spun into yarn and woven into fabric. Cotton is a natural fiber and is biodegradable. It is also a renewable resource. Cotton is a very important crop for many countries. It is used to make many different types of clothing, including t-shirts, jeans, and dresses. Cotton is also used to make paper and other products. Cotton is a very versatile and useful crop.



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