

**Proceedings of the Annual Group Meeting- of AICRP on Cotton (2015-16) held
from 7-9th April, 2016, at Navasari Agricultural University, Surat**

Session 1: Inaugural Session

Venue: APMC Krushi Bazar,

Date: 07/04/2016

The Inaugural session of the AGM 2016 of AICRP on cotton was held on 7th April 2016 in the auditorium of APMC, Krishi Bazar, Surat.

The following dignitaries coming together was the high light of the session.

Sh. Ramanbhai Patel, Chariman, Gujarat State Agricultural Marketing Board - Chief Guest

Dr. C.J. Dangaria, Hon'ble Vice Chancellor, Navasari Agricultural University, Navasari

Dr. R.K. Singh, Assistant Director General (Crop Sciences), ICAR, New Delhi

Dr. K.R. Kranthi, Director, ICAR-Central Institute for Cotton Research, Nagpur

Dr. P.G. Patil, Director, CIRCOT, Mumbai

Dr. A.N. Sabalpara, Director of Research, NAU, Surat

Dr. N. Gopalakrishnan, Former ADG (CC), ICAR

Dr. A.H. Prakash, Project Coordinator (Cotton improvement), CICR, RS, Coimbatore

Dr. B.G. Solanki, Organising Secretary & Research Scientist (Cotton) MCS, NAU, Surat

The Inaugural session started with the ICAR song and the NAU song.

Welcome Address was delivered by Dr. A. N. Sabalpara, Director of Research, NAU, Navasari. He welcomed all the dignitaries and the delegates from SAU's and ICAR Institute's across the country and the representatives from the private companies who were attending the meeting. He also briefly explained the major research achievements of NAU, Surat and that of Gujarat as a whole in respect of cotton.

Following this, ceremonial "Lighting of lamp" was done by all the dignitaries to inaugurate the Annual Group meeting of AICRP on Cotton.

Dr. A.H. Prakash, Project Coordinator (Cotton), CICR, RS, Coimbatore presented the Project Coordinator's report for the year 2015-16 in which he highlighted the major research findings. He briefed the august gathering on the area, production and productivity that was under cotton cultivation for the year 2015-16 and also gave brief information on breeding, agronomy, entomology and pathology programs undertaken during the year 2015-16 and the highlighting findings which were noticed. During the year 2014-15, fifteen cotton cultivars / hybrids have been identified by the Variety Identification Committee for various agro-climatic zones. As quality seed availability is a key component in enhancing productivity, an effective maintenance of Nucleus and Breeder seed programme was undertaken by the concerned participating centres of AICRP on Cotton. The Breeder seed production as per the National seed indent 2015-16 was taken up at different centres of AICRP on Cotton and at ICAR-CICR, Regional Station, Coimbatore. The production was 40.56 q against the indent of 21.86 q, over and above the indent in almost all the locations.

Under the AICRP on Cotton- Tribal Sub Plan (TSP), a sum of Rs. 14 lakh was utilised to conduct training programme, demonstrations and other extension programs to disseminate the cotton production technologies exclusively to the tribal cotton farmers for improving their livelihood status

During 2015-16, one application for variety Central cotton CCH 2623 for registration, under PPV&FR Act, 2001 was submitted through NBPGR. Monitoring of DUS trials was conducted on 7.11.2015 at MPKV Rahuri, on 19.11.2015 at CICR, Nagpur and on 13.1.2016 at CICR, Regional station, Coimbatore under the chairmanship of Dr.K.R.Kranthi, Director, CICR, Nagpur.

During the year 2015-16, under National Food Security Mission (NFSM) (Commercial Crops), 245 Front Line Demonstrations on Integrated Crop Management (ICM) on cotton, 157 Front Line Demonstrations on Desi / ELS cotton / ELS cotton seed production and 136 Front Line Demonstrations on intercropping with cotton were conducted by sixteen centres of All India Coordinated Research Project on Cotton with a budget outlay of 35.00 lakh rupees as against the proposed budget of 47.50 lakhs.

This was followed by Release of The Annual Report of AICRP on Cotton for the year 2015-16 by the Chief Guest Sh. Ramanbhai Patel and the dignitaries on the dais. The CD version the Annual Report of AICRP on Cotton for the year 2015-16 was released Dr. C.J. Dangaria, Hon'ble Vice Chancellor, NAU, Navasari. The FLD report for the year 2015-16 was released by Dr. K.R. Kranthi, Director, ICAR- CICR, Nagpur.

Special address was delivered by Dr. K.R. Kranthi, Director, CICR, Nagpur in which he gave emphasis for developing desi cotton varieties as that will be the future for cotton to counter the CLCuD and Pink Bollworm incidence. He also threw light on the American Bollworm impact on cotton. He expressed his concern over the impact of Pink bollworm during the cropping season of 2015-16. He delivered extempore speech which sensitized the delegates on the issue of insect pests.

Special address was delivered by Dr. P.G. Patil, Director, ICAR-CIRCOT, Mumbai in which he gave information of the nature of work being undertaken by CIRCOT in determining the fibre strength of cotton. He also gave information on shifting from ICC mode to HVI mode in calculating the Fibre strength of the cotton. He explained the pros and cons of the two methods of calculating the fibre strength.

Special address was delivered by Dr. R.K. Singh, ADG (CC), ICAR, New Delhi informed the house that AICRP on Cotton is entering its 50th year of relentless service to Cotton fraternity. He congratulated all the members of the Cotton Family. Cotton stands for civilization and clothes the mankind revealing a saga of how a simple natural fiber can be made into thread, fabric and apparel through technological innovations. Cotton and the textile industry have special significance to India in all phases of the country's existence - historical, social and economical. He expressed great concern of council over the burning issues in respect of cotton and requested the august gathering the find the way out and develop contingency plans for unforeseen calamities.

Special address was delivered by Dr. N. Gopalakrishnan, Former ADG (CC), ICAR. He shared his vast experience in the field of cotton and his experience as Project Coordinator (Cotton) and ADG (CC) to the gathering

Presidential address was delivered by Dr. C.J. Dangaria, Hon'ble Vice Chancellor, NAU, Navasari. He welcomed all the dignitaries and delegates to Surat. He briefed the audience about the achievements and future research programme of NAU, Surat. He also explained to the gathering how cotton is an important crop in Gujarat and what efforts are being undertaken by the university to increase the area, production and productivity of cotton. He also briefed about

the FLD programmes and other media being used to keep the farmers updated with the latest development in the field of cotton which are undertaken by the university

Four Bulletins published from NAU, Surat was released by the Chief Guest Sh. Ramanbhai Patel.

The Chief guest of the function Sh. Ramanbhai Patel, Chariman, Gujarat State Agricultural Marketing Board delivered the speech and shared his experience with the audience. He informed the delegates how the venue where the present meeting is held was built and how the Farmers Cooperative movement in Gujarat state has shown path to even foreign countries to follow.

Vote of thanks was presented by the organizing secretary Dr. BG Solanki, RS(Cotton), MCS, NAU, Surat.

The inaugural session ended with National Anthem.

Session 2: Proceedings of review results of AICRP trails during 2015-16

Chairman	: Dr. R.K. Singh, Assistant Director General (Commercial Crops), ICAR
Co-Chairman	: Dr. A.N.Sabalpara, Director Research, NAU, Navsari Dr. K.R. Kranthi, Director, CICR, Nagpur
Convener	: Dr. A.H. Prakash, PC (Cotton)
Breeding Trials	: Dr. S. Manickam, PI (Breeding)
Agronomy Trials	: Dr. K. Sankaranarayanan, PI (Agronomy)
Entomology Trials	: Dr. (Mrs) B. Dharajothi, PI (Entomology)
Pathology Trials	: Dr. Dilip Monga, PI (Pathology)
Fiber Quality Evaluation	: Dr. P.K. Mandhyan, QEI Division, CIRCOT, Mumbai
Rapporteurs	: Dr. D.H.Patel of MCRS, NAU, Surat Dr. S. Usha Rani, Sr. Scientist, CICR, RS, Coimbatore Dr. A. Manivannan, Scientist, CICR, RS, Coimbatore

Panel meeting on review results of AICRP on Cotton (2015-16) was held in the morning session on 07.04.2016 and presentations on achievements of Plant Breeding, Agronomy, Entomology, Pathology and Quality evaluation of fibre attributes during the year 2015-16 was done. The session was chaired by Dr R.K.Singh, ADG (CC) and co chaired by Dr K.R.Kranthi, Director, CICR, Nagpur. Dr. A.Manivannan, Dr. S.Usharani of CICR and Dr D.H.Patel of MCRS, NAU, Surat acted as rapporteurs for all the sessions under this panel. Dr. S .Manickam, PI (Plant Breeding), Dr.K.Sankarnarayanan, PI (Agronomy), Dr. B.Dharajothi, PI (Entomology), Dr.D.Monga, PI(Pathology) and Dr. P.K. Mandhyan, Senior scientist, QED, CIRCOT, Mumbai presented the reports of respective divisions. Results were presented in the following important thematic areas:

Plant Breeding

A sum total of 33 trails in irrigated and 22 trails in rainfed were conducted in all three zones. Few entries showed promise with higher yields than zonal trail in North Zone. Among all the trials, desi entries with compact genotypes showed higher productivity over past four years in North zone, this is the positive sign of promoting desi varieties in North India. In central Zone, stress for better fibre quality- especially fibre length and strength was given importance. Performance of desi hybrids under rainfed condition was very good. Some of the desi entries distinctly showed the length of 30 mm with 30 g/tex strength. This is the big shift with emergence of desi regime with a promise to replace *G. hirsutum*, in central rainfed zone.

Compact varieties out performed over hybrids in terms of productivity. In South zone, one entry showed 34 mm length with 34g/tex strength, this is almost equivalent to Egyptian Giza varieties. Dr.K.R.Kranthi appreciated the relentless efforts of breeders.

Agronomy

Three trials, namely Agronomy requirement of pre released cultures; development of agro technique for Bt cotton and organic cotton, input management were under taken at all three zones. Moisture Conservation and control treatments were at par and poly mulching recorded highest seed cotton yield. For organic cotton production, *Stylosanthus scabra* was found to be effective intercrop. Screening of cultures for abiotic stress and biochemical profiling (seed oil, gossypol and protein content) were carried out at Hisar, Surat and Dharwad. Higher oil content and higher poly unsaturated fatty acid content was observed in PBH 21. Low gossypol content was recorded in RAH 1069. Dr.K.R.Kranthi emphasised the need of improving agrotechniques for Extra Long Staple (ELS) cotton in India. Dr.A.N.Sabalpara, Director Research, NAU, Navsari stressed the inclusion of biofertilizer trails in AICRP.

Entomology

The experiments were conducted in the discipline of Entomology under All India Coordinated Research Project (AICRP) on Cotton, in five centers of North Zone (Faridkot, Bathinda, Hisar, Sirsa and Sriganganagar), eight centers in Central Zone (Surat, Junagadh, Khandwa, Akola, Rahuri, Nanded, Bhawanipatna and Banswara) and seven centers in South Zone (Dharwad, Raichur, Chamrajnagar, LAM Guntur, Nandyal, Coimbatore (TNAU) and Srivilliputhur).

During 2015-16 season, population dynamics of key pests of cotton in relation to climatic conditions were recorded at weekly interval for both sucking pests and bollworms on Ganganagar Ageti, RS 2013, HS 6, and RCH 650 BGII respectively for North Zone (Sriganganagar, Sirsa, Faridkot, Hisar, Batinda). In Central Zone (Akola, Nanded, Khandwa, Rahuri, Banswara, Bhawanipatna, Surat and Junagadh) and South Zone (Dharwad, Raichur, Chamrajnagar, LAM Guntur, Nandyal, Coimbatore [TNAU] and Srivilliputhur), infestation of sucking pests and bollworms were recorded in DCH 32 and RCH2 Bt and RCH2 BG II.

An area of around 14.73 lakh ha (Haryana-5.76, Punjab-4.50 & Rajasthan 4.47) was sown under cotton during 2015-16 in North zone. In general, the crop was severely affected due to whitefly epidemic in the entire zone. Hot, humid and partly cloudy weather with intermittent rains during June/July but with overall less rainfall were the important factors contributing to higher incidence. During April, May, June, July, August and September maximum temperature recorded was 41.7, 45.0, 43.8, 40.0, 37.2 and 38.20C and minimum 15.4, 21.0, 22.6, 22.2, 25.0 and 21.6 0C respectively. A total of 203.6 mm rainfall has been recorded during the cotton season at station observatory as against around 300 mm of average rainfall during this period. The rainfall received during April, May, June, July, August and September till date was 25.6 mm 3.0 mm, 22.8 mm, 90.4 mm, 44.6 mm, and 17.2 mm respectively. Irrigation was supported by tube wells as well as canal water. May rainfall also led to crust formation in many farmer fields and resowing was carried out in such cases. In 23 SMW week of May, due to high temp, there was burning of seedlings in late sown crop. The white fly incidence remained high in cotton growing areas of Haryana, Punjab and Rajasthan during this period.

Similarly in Central Zone and South Zone, the crop was initially exposed to moisture stress owing to delayed onset of monsoon. In the vegetative growth phase, there was heavy rains and waterlogging and this was followed by drought during the peak flowering and boll

development stage inducing forced boll bursting. There were reports of severe pink bollworm incidence in Andhra and Karnataka in South and Gujarat and Maharashtra in central Zone. Two Monitoring team was constituted to assess the pink bollworm damage. Dr Prakash (PC-Cotton) along with Dr Chenga Reddy, Senior Cotton Breeder, ANGRAU, Guntur, monitored the cotton growing areas of Telangana and Andhra Pradesh. The second team under the Chairmanship of Dr K.R. Kranthi, Director, CICR, Nagpur visited all the cotton growing regions of Gujarat state to monitor the Pink Bollworm status. The other members were Dr A.H. Prakash, PC (Cotton), Dr (Mrs) Sandhyakranthi, Head, DCP, CICR, Nagpur and Dr M.V. Venugopalan, Principal Scientist (Agronomy), CICR, Nagpur. The report was submitted to Hon'ble Deputy Director General (Crop Science) for perusal along with the strategies to combat the menace.

Pathology

Cotton Leaf Curl Virus Disease (CLCuD) was major disease in North zone, with higher incidence was observed at Fazilka of Punjab and Hisar of Haryana. Verticillium wilt was a severe disease in South zone. New diseases like Tropical rust and Tobacco Streak Virus (TSV) were noticed at Central and South zone respectively. Two entries viz., Su-Flum and Bihani-251 showed moderately resistant reaction against CLCuD at Faridkot. Entry SVA1118 showed resistant to Alternaria Leaf Blight (ALB), Bacterial Leaf Blight (BLB), Grey mildew and rust at Dharwad. Disease severity map has been prepared for Punjab, Haryana and Rajasthan by CICR.

Fibre Quality Attribute

Shift in the basic cotton trade occurred as variety names such as Jaydhar, J-34, Sankar-6 has been converted into brand names. From this year onwards testing will be on HVI mode only as international trade is on HVI mode. Parameters namely Upper Half Mean Length (UHML), Uniformity Index, Micronaire, Strength were recorded in HVI mode. The range of 22-30 mm, 3.8-5.2 mic and 25-29g/tex was observed for fibre length, maturity and strength respectively. For timely submission of fibre data Dr Mandhyan requested all the Agronomists to send good quality lint samples latest by 31st Dec to complete spinning in time. AICRP code number has to be sent along with samples for fibre testing. Sample size for full spinning (ginned cotton) is 6.0 kg and for fibre testing is 100 grams. Dr. K.R.Kranti suggested mentioning the fibre traits in both ICC and HVI mode for at least two years in order to familiarize with new mode of testing.

The session concluded with the vote of thanks by Dr. S.Usharani, Senior Scientist, CICR, RS, Coimbatore.

Session 3: Public Private Partnership & Discussion on Key Issues

Dr. N. Gopalakrishnan	: Former ADG (CC), ICAR, New delhi
Dr. R.K. Singh	: ADG (CC), ICAR, New Delhi
Dr. K.R. Kranthi	: Director, CICR, Nagpur
Dr. S.S. Sewach	: Director of Research, CCSHAU, Hisar
Dr. R.K. Gumber	: ADR, APU, Ludhiana
Dr. D. Monga	: PI (Pathology), ACIRP on Cotton
Dr. P.P. Zaveri	: Secretary, Gujarat Seed Association

Public Private Partnership session was held under the chairmanship of Dr. N. Gopalakrishnan, Former ADG (CC), ICAR, New Delhi and Co-chairmanship of Dr. R. K. Singh, ADG (CC), ICAR, New Delhi and Dr. K. R. Kranthi, Director, CICR, Nagpur. Dr. S. S. Siwach, Director of Research, CCSHAU, Hisar, Dr. Gumber, Director of Research, PAU, Ludhiana, Dr. Dilip Monga, Head, CICR, Sirsa and Dr. P. P. Zaveri, Secretary, Gujarat Seed Association was the members.

The session aimed to identify the crucial issues for frontier research through public private partnership to increase profit and reducing input cost of cultivation. There is a need to take stock of the existing scenario, experiences of past partnerships, identify the missing links and plan for the future to meet the challenges in cotton research and cultivation which has ultimate goal to benefit the farmers. Dr. N. Gopalakrishnan as chairman of the session emphasized the important role of PPP in sustaining and strengthening cotton cultivation in the country. He sought renewed thrust and emphasis on emerging threats and challenges. There is need to find strength and identify the weakness in the present PPP mode. He informed the house that discussion for both the session (PPP & Discussion on key issue) going simultaneously.

Dr. K. R. Kranthi invited open discussions to first prioritize the issues that we are facing now a days in cotton. He informed that PBW developed resistant to BG II and probability of American bollworm developing resistant to BG II increasing, development of insect resistance to insecticides and issue of whitefly and cotton leaf curl in north zone are some of the issues and invited discussions to prioritize issue first and later discussions on the issues.

Representative, Dow Agro Science (Gudge) showed concern of thrips as emerging issue. Dr. Sandhya Kranthi informed the usefulness of pheromone traps for PBW monitoring and mass trapping and showed concern about the quality of the lures of the pheromone traps and sought consistency in the quality.

Dr. S. S. Patil showed concern for non compliance of refugia and opined one acre non GM cotton (preferably desi cotton) should be imposed compulsory to grow by seed dealers / suppliers in each village.

Dr. Dharajothi informed the flare up of minor pests like Red Cotton bug during boll opening stage to maturity stage and express her concern for management strategy as issue as we generally recommending to avoid use of chemicals at boll opening stage to maturity stage.

Representative Bayer Crop Science (Dr. Dagoankar) said that *Helicoverpa* is also building up resistance to transgene what Director, CICR is telling, there is a concern as single gene variety is still selling in the market. Rathivelu told that there was a gap between promoting compact genotypes in HDPS and mechanization in the harvesting. There is need to address mechanization. Dr. Venugopalan informed that we are having all mechanization for HDPS except harvesting. Dr. Satyanarayanan informed that pickers they developed are showing good progress for the crop at 4 to 5 ft height.

Instead of *hirsutum*, Dr. Siwach shared experience on popularization of *arboreum* cotton by taking up FLDs on large scale in Punjab, Haryana and Rajasthan. At present the stumbling block is the availability of seed for conducting and promotion on massive scales, as earlier the *arboreum* area in the country was 28 per cent. He also emphasized the need of centre of excellence for artificial screening against whitefly instead of allotting experiments to 10 different centres that would help in breeding good resistant/tolerant variety to whitefly.

Regarding non compliance of refuge, Dr. S.S. Patil suggested atleast retaining one acre non Bt plots in each village by seed suppliers, Dr. Kranthi explained the mechanism of resistance development and stated that no amount of refuge will help on current breakdown of resistance as resistant allele frequency in the population played important role which was high against Cry 1 Ac and other candidate genes knocking the door are poor against PBW. Further, many of the seed companies have problem of isogenic non Bt seed multiplication and even with seed packets there was a problem of mixing or providing non Bt seeds of *arboreum*, *herbaceum*, *hirsutum*, non germinated seeds or F2 seeds are serious concern. On mechanization, he informed that good progress has been made and machine is in final stage and still chance to improve in Indian perspective as present trash content is 12 per cent. Dr. Zaveri, Secretary, Gujarat Seed Association clarified that seed companies are supplying 120 g of Non Bt seeds. As companies are putting lot of efforts on non Bt seed multiplication and farmers are not adopting refuge and then why they have to waste money for producing non Bt seeds. Earlier, companies were using female line as non Bt type and male as Bt type for BG I, 5 to 8 per cent non Bt lines act as refuge. Further, he informed that the PBW population was so high in the ginning factories that we are drinking juice of PBW instead of cotton seed oil. However in BG II, the concept is change where male and female Bt parents crossed and all seeds have 100 % Bt genes. He informed the best examples of PPP in tackling the PBW problem is with all stakeholders come together and formulate the action plan and its wide scale implementation that prevented major loss. He also informed that in Gujarat, several companies are ready

to take up HDPS suited varieties on PPP mode, if CICR is ready to share the Bt varieties. Dr. Zaveri also stressed to form **Consortium of Public Private Partners in Cotton** to help private companies to adopt R & D of public centres (AICRP + CICR) (Seed, Technology) etc. as in India, Majority of seed companies are small and medium unable to spend huge R & D cost, but all put together we can do big job. Dr. Monga highlighted the current situation of CLCuV and Whitefly epidemic. For North Zone, on PPP mode, CLCuV testing protocol was also developed and monitoring team was also formed including all stakeholders. The part of the report was already submitted to DAC. The first issue is the PPP which must be strengthened and long term planning should be required. For whitefly, the burden on the shoulders of scientists as action for collaborating mode with private company is lacking. PAU government had spent Rs. 1000 crores. Seed and Pesticide association should have to support for awareness and management campaign. Representative, MAHYCO informed that we have been reactive all the time and stressed the need of formulating working group on IRAC (Insecticide Resistance Action Committee) involving ICAR/SAU/Pesticide Company/Seed Company/ NGO on account of increased cases of resistance to insect pests and transgenes in cotton and many other crops for effective proactive role and dissemination of the IRM strategies. Dr. Tuteja also alarmed the situation of use of mixture of insecticides by the farmers and educated all pesticide dealers. The e-kapas network should also be utilized for educating them. Dr. Gopalakrishnan in response informed that CICR, Nagpur is playing very pro-active role and providing weekly advisory in almost all regional languages which include strategies to manage as well as weather and pest forecasting for 7 days. Short duration variety with resistance to sucking pests is a brilliant idea. Dr. Kranthi assured that with HDPS either with hirsutum or arboreum having 32 to 37 mm staple length, short duration (120-140 days) with 7-8 bolls / plant in compact stature is ideal for Indian condition where major area under rain fed region and showed greater hope. He also informed that short duration variety. The released variety from this group should also be taken to popularize with agro-techniques prescribed. Commenting on quality and price of pheromone trap, Dr. Kranthi assured that CICR is working on re-designing the pheromone trap with pheromone and insecticide in the septa which will be cheaper instead commercial high price pheromone traps. Dr. Gumber stated that efficacy of insecticides whitefly management where spraying with electrostatic nozzles and Punjab had this year only 223 kg lint productivity and government was blaming SAU scientists whereas private companies did not participate in spreading management strategies. He requested private companies to restrict their one or two good whitefly tolerant varieties/ hybrids for next years. In spite of announcement well in advance, Dr. Praksh informed that private companies are not coming forward to participate deliberately and express their views or missing links. Representative Bayer crop science responded that our company people are in dilemma that up to what extent partnership be formed as investment no problem but IPM and IRM concerned us most due to stringent regulations. Dr. Sheoraj explained that importing good high yielding tolerant varieties (Giza/Mahima Cotton) from abroad is difficult, they had tried to import earlier but could not succeed. Dr. Kulkarni expressed his concern over high inventory management cost against CLCuV disease and no entry showing consistent performance. Recent Private sector breeders meet revealed different results of screening parents and hybrids as informed by Sh Rajendran, Director (R & D) Representing Raasi seeds. He also emphasized the need of entries to be tested under AICRP evaluation system. Dr N. Gopalakrishnan, Former ADG at the end emphasized the need of collaborative actions on PBW management with all merits and demerits to follow for delaying resistance and sustenance of the technology, understanding resistance mechanism and better management in coming years. At the concluding remark by Dr. R. K. Singh, ADG assured that ICAR will re-look into policy related matter and simultaneously on impact of climate change, BG II susceptibility to PBW and other bollworms related issues in CZ and SZ and CLCuV & Whitefly in NZ. The collaborative work of both Public and Private in PPP mode is the priority of the day to tackle the emerging issues.

Session 4: Concurrent Session

Breeding Panel

Date: 08/04/2016

Chairman : Dr. S. S. Siwach, Director of Research, CCSHAU, Hisar
Co-Chairman : Dr R.K. Singh, ADG (CC), ICAR, New Delhi
Convener : Dr. S. Manickam, Principal Investigator, AICRP (Plant Breeding),
Rapporteurs: : Dr. A. Manivannan, Scientist, ICAR-CICR, RS, Coimbatore
Dr. B. K. Rajkumar, Asst. Res. Sci., MCRS, NAU, Surat

General Discussion

- Poor germination of few entries and checks at many locations with less than 10% germination was vitiating trials. Hence, it was stressed to ensure supply of good quality seeds for the trial.
- Irrigated trials were not conducted properly at some centres and they were conducted mostly as rainfed trials. It was requested that the irrigated trials should be conducted with proper irrigation schedule.
- There should not be any supportive irrigation including life irrigation allowed under rainfed trails.
- Data should be verified at centre level before submitting to PC and data once submitted will not be changed at later stage.
- Release proposal should be submitted in proper format in time. In release proposal, all the developers should sign and it should be routed through Director Research of respective SAUs. Good photograph of the entry is mandatory. Release Proposals of new varieties / hybrids complete in all respects including agronomy data, microspinning data, endorsement by competent authority and other necessary particulars as per the standard format (copy available at www.cicr.org.in) shall be submitted to the office of the Project Coordinator (Cotton) as informed in the website. Incomplete proposals will not be put up by the Project Coordinator to the committee. The package of practice, morphological characters as per DUS test of varieties and in case of hybrids including the parents are to be submitted along with the proposals. **The copy of the concerned page of Breeding trial, Pest and disease reaction data of AICRP report and CIRCOT fibre quality data should be appended.**
- Dr S. S. Siwach opined that non performing centres should be removed from AICRP. Wherever, the breeders are not in position, the trials will not be allocated.
- For considering the data of a centre, the bench marking of Zonal check will be done based on the average performance of previous five years yield at respective centre. House also agreed to this concern. The breeder should submit the bench mark value of the zonal check of the corresponding trial.
- Scientist from voluntary centres requested additional allocation of funds for conducting trials. It was informed that there are no separate funds for allocation to voluntary centres and the funds are distributed by the Project Coordinator from the contingency amount of PC's Cell based on number of trials conducted by the centre. However, voluntary centres may send the proposal for regularizing the centre to council through their respective SAUs.
- Not more than one entry will be permitted for Breeding trails from voluntary centres, since number of entries are more in some of the national trials.
- The Project Coordinator stressed that if any post is kept vacant for more than one year, the post will be withdrawn and allotted to centres which are short of manpower.
- From this year onwards, only one year trial will be conducted for intra hirstum hybrids at Zonal level to find the yield potential of the hybrid across the locations.

- Based on the interactive meeting of the Hon'ble DDG (Crop Science), it has been decided to continue with seed oil estimation of all the entries in all the trials. With the approval of the Project Coordinator, it has been decided to estimate the seed oil estimation zone wise for all the trials at Hisar (North zone locations), Surat (Central zone locations) and Dharwad (South zone locations). All the breeders are requested to send the seed samples from first picked kapas to the Biochemists of the above centres for oil estimation.

Dr. S. Manickam requested the breeders to bestow ultimate care in producing breeder seed as per the DAC indent. The breeder seed production can be undertaken based on the DAC indent as per official website of DAC at www.seednet.gov.in and they need not wait for BSP I from the Project Coordinator. It is mandatory for the concerned breeders to produce indented seeds without fail.

While formulating the technical programme of the breeding trials, both national as well as zonal, for the year 2016-17 he requested the breeders to submit two packets of seeds (in case of varieties) in addition to the number of locations finalized in the panel for submitting to the Director, CICR, Nagpur and to NBPGR for long term storage of elite breeding materials.

Last date for submission of seeds at CICR, Coimbatore: 26/04/2016 before 4.00 PM

Issue of coded seeds: 29/04/2016 after 3.00 PM

Private R & D – Please pay the testing fee (@ Rs. 60,000 + Service Tax as applicable per entry at national level) in the form of **Demand Draft drawn from any Nationalized Bank** drawn in favour of **Project Coordinator (Cotton Improvement) & Head** payable at Coimbatore while submitting the seeds. No entry shall be entertained without the submission of testing fee and R & D recognition by DST. The companies which have not updated the R & D recognition shall update and submit a copy at the time of submitting the seed without which the entry shall not be included in the trial.

GENERAL POINTS TO BE NOTED

- ❖ The seed sponsored for breeding trials should be acid delinted and without any seed treatment and packed individually as indicated in the concerned trials. Fuzzy seeds and seeds treated with any coloured chemicals will be out rightly rejected during coding.
- ❖ **Each packet of seed must be securely packed and have name of the entry, trial name, quantity of seeds etc.**
- ❖ The senior scientists of the concerned state are requested to send the local check varieties / hybrids of those trials being conducted in the state / zone (including private R & D trials) without fail. **All the check varieties / hybrids should be packed separately and legibly labeled mentioning the name of the trial. The check seeds should not be mixed with the entry seeds.**
- ❖ The trials should be conducted strictly as per the technical programme **and no other entry should be included** in the trial (including the check varieties).
- ❖ All the trials should have at least one border row.
- ❖ The seeds harvested in both varieties and hybrids during first picking are to be sent to the Biochemist of the respective zone for analyzing seed oil content.
- ❖ All the data sheets should have Name of the agency conducting trial, location of the trial (and not the location of the company) and the name of the trial.
- ❖ All those who are conducting the breeding trials are requested to furnish both the mean data as well as the replicated data analyzed statistically. The mean data is to be submitted as per the model data sheet given below as **Excel sheet and not as Word file.**

S. No.	Code#	SCY (kg/ha)	LY (kg/ha)	GOT (%)	Boll No	Boll Wt (g)	Upper Half Mean Length (mm)	Mic	BS (g/tex)	Seed Oil (%)
1	101									
2	102									
N	10n									
	CD@5%									
	CV %									
	Bench mark value of zonal check = _____									

#Code numbers in ascending order; n=number of coded entries

- ❖ The data should be submitted separately in different Excel sheets for each trial, and the data of different trials are not to be combined in a single sheet.
- ❖ The incomplete and insufficient data will not be included in report preparation, and shall be reported to the higher officials for non compliance.
- ❖ **The lint samples pooled over replications should be prepared for all the entries from the first picked kapas**, cleaned neatly and labeled properly (mentioning the name of the agency conducting the trial, location of the trial, and AICRP code number in each packet of the lint sample) and sent to concerned CIRCOT centre (**National trials - CIRCOT unit at Nagpur, North Zone Trials – CIRCOT unit at Sirsa; Central Zone trials – CIRCOT Unit at Surat and South Zone – CIRCOT unit at Coimbatore**) for fibre quality evaluation in time (**on or before 30-12-2016**). Kindly send the lint samples with AICRP Breeding trial code only to CIRCOT, or else the sample will not be evaluated.
- ❖ The copy of the covering letter of lint sample submitted to CIRCOT must be communicated to the Principal Investigator (Plant Breeding) and to the Project Coordinator.
- ❖ **Kindly note that the last date for the receipt of the compiled data is 15-01-2017 (for north zone locations), 31-01-2017 (for central zone locations) and 15-02-2017 (for south zone locations). Data (soft copy) received after the due date will not be included in the report.**
- ❖ All are requested to visit the website of CICR / AICRP at www.cicr.org.in for any information, announcement etc. No communication in any respect will be sent individually.
- ❖ **All the breeders are requested to part 40g seed of varieties and 20 g of hybrids for Pathology / entomology observations and no separate packets will be given to pathologists / entomologists.**
- ❖ Seeds received in less quantity than the prescribed quantity will not be included in the trial.
- ❖ All the breeders of the varieties / hybrids recommended for agronomic trials are requested to submit the required quantity of **seeds directly to the concerned agronomists (and not to Project Coordinator)** and to keep track with the agronomists for getting the data on agronomy trial and to submit the lint samples for micro-spinning to CIRCOT, Mumbai.

NATIONAL TRIALS

Br. 02a - IET- *G. hirsutum* (IRRIGATED)

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 120 g X 19+2

S. No	Name of Entry	Sponsor	Locations	LC (2 pkts)
1.	RB – 616	ARS, Banswara	SGNR	RS 2013
2.	RB - 617	ARS, Banswara	Hisar	H 1236
3.	PBH 42	PAU, Bathinda	Faridkot	LH 2108
4.	PBH 47	PAU, Bathinda	Bathinda	LH 2108
5.	BS 1	OUAT, Bhawanipatna	Sirsa (C)	H 1236
6.	BS 2	OUAT, Bhawanipatna	Kanpur	Vikas
7.	TCH 1199	TNAU, Coimbatore	Banswara	Wagad Kalyan
8.	HS 297	CCS HAU, Sirsa	Surat	GN.Cot. 22
9.	HS 298	CCS HAU, Sirsa	Talod	GN.Cot. 22
10.	CPD-1601	UAS Dharwad	Junagadh	GN.Cot. 22
11.	CPD-1602	UAS Dharwad	Rahuri	RHC 688
12.	ARBH-1601	UAS Arabhavi	Bhawanipatna	Surabhi
13.	F 2453	PAU, Faridkot	Raichur	Sujay
14.	F 2462	PAU, Faridkot	B'Gudi	Sujay
15.	GISV 310	NAU-Surat	Lam	L 604
16.	GSHV 185	NAU-Surat	Coimbatore	MCU. 13
17.	GJHV-477	JAU - Junagadh	Srivilliputhur	SVPR. 4
18.	GJHV-518	JAU - Junagadh	Arabhavi	ARBH 813
19.	H 1489	CCS HAU, Hisar	Chamrajnagar	Sahana
20.	L 799	ANGRAU, Lam		
21.	L 1384	ANGRAU, Lam		
22.	CNH 39	CICR, Nagpur		
23.	CNH 108	CICR, Nagpur		
24.	RHC – 1202	MPKV, Rahuri		
25.	RHC – 1217	MPKV, Rahuri		
26.	RAH 1070	UAS, Raichur		
27.	RAH 1071	UAS, Raichur		
28.	BGDS 1072	UAS, B' Gudi		
29.	AR-9108	Shakti Vardhak		
30.	CSH 2811	CICR, Sirsa		
31.	CSH 3269	CICR, Sirsa		
32.	TSH 324	TNAU, Srivilliputhur		
33.	TSH 327	TNAU, Srivilliputhur		
34.	CCH 16-1	CICR, Coimbatore		
35.	CCH 16-2	CICR, Coimbatore		
36.	RS 2835	ARS, Sriganganagar		
37.	SIMA 5	SIMA CDRA		
38.	Sartaj	Shakti Agrotech		
39.	WGCV 79	RARS, Warangal		
40.	ZC (F 2228/ RHC 0717/Suraj)			
41.	Quality Check(F 2164/Suraj/Suraj)			
42.	LC			

Br. 02 b - IET- *G. hirsutum* (RAINFED)

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 120 g X 8 + 2

S. No	Name of Entry	Sponsor	Locations	LC (2)
1.	AKH-1301	PDKV, Akola	Banswara	Wagad Kalyan
2.	RB – 610	ARS, Banswara	Bharuch	G.Cot.16
3.	RB – 611	ARS, Banswara	CICR, Nagpur	AKH 8828
4.	BS 1	OUAT, Bhawanipatna	Akola	AKH 8828
5.	BS 2	OUAT, Bhawanipatna	Nanded	NH 545
6.	CPD-1651	UAS Dharwad	Dharwad	Sahana
7.	CPD-1652	UAS Dharwad	Nandyal	Sivanandhi
8.	ARBH-1651	UAS Arabhavi	Perambalur	KC 3
9.	GBHV-184	NAU-Bharuch		
10.	GBHV-185	NAU-Bharuch		
11.	H 1489	CCS HAU, Hisar		
12.	IH 11-5	RVSKVV, Indore		
13.	IH 11-16	RVSKVV, Indore		
14.	TKH 0250/2	TNAU, Kovilpatti		
15.	TKH 1185/1/3	TNAU, Kovilpatti		
16.	L 1060	ANGRAU, Lam		
17.	CNH 7012	CICR, Nagpur		
18.	CNH 09-77	CICR, Nagpur		
19.	WGCV 48	RARS, Warangal		
20.	PH 1071	VNMKV, Nanded		
21.	NDLH – 2027	ANGRAU, Nandyal		
22.	NDLH - 2030-2	ANGRAU, Nandyal		
23.	RAH 1070	UAS, Raichur		
24.	RAH 1071	UAS, Raichur		
25.	BGDS 1072	UAS, B' Gudi		
26.	CCH 16-3	CICR, Coimbatore		
27.	CNH 1125	CICR, Nagpur		
28.	Quality Check (Suraj)			
29.	ZC (NH 615/ NDLH 1938)			
30.	LC			

Br. 06 a – IET of Compact genotypes under irrigated condition

Design: R.B.D. Reps: 3 Rows: 3 Row Length: 6.0 m

Spacing: 60.0 cm X 15.0 cm (CZ&SZ); 67.5 X 10 cm (NZ)

Seed quantity: 300 g X 9+1

S. No.	Genotype	Sponsor	Location	Local Check (2)
1.	BS 30	OUAT, Bhawanipatna	Faridkot	F 2383
2.	TCH 1873	TNAU, Coimbatore	Hisar	H 1098-I
3.	DSC-1601	UAS Dharwad	Sriganganagar	RS 875
4.	ARBC-1601	UAS Arabhavi	Talod	G. Cot. 20
5.	F 2639	PAU, Faridkot	Bhawanipatna	Suraj
6.	GISV 298	NAU-Surat	Rahuri	Phule 688
7.	H 1506	CCS HAU, Hisar	Coimbatore	Suraj
8.	RHC-1312	MPKV, Rahuri	Raichur	RAH 100
9.	RHC-1333	MPKV, Rahuri	Lam	L 604
10.	RAHC 1020	UAS, Raichur		
11.	RAHC 1021	UAS, Raichur		
12.	CSH 3129-2	CICR, Sirsa		
13.	CSH 5640	CICR, Sirsa		
14.	CCH 16-5	CICR, Coimbatore		
15.	CCH 16-6	CICR, Coimbatore		
16.	RS 2818	ARS, Sriganganagar		
17.	RS 2827	ARS, Sriganganagar		
18.	TCH 1819	TNAU, Coimbatore		
19.	GJHV 522	JAU, Junagadh		
20.	Local Check			

1. Seed cotton yield (kg/ha) at 130 DAS
2. Seed cotton yield (kg/ha) at 160 DAS
3. Total Seed cotton yield (kg/ha) at 160 DAS (1+2 above)
4. Percentage contribution of yield at 130 DAS
5. No. of bolls/m²
6. Plant height (cm)
7. Days to 1st boll bursting
8. No. of monopodia / plant
9. No. of sympodia / plant
10. Boll weight (g/boll)
11. Lint index (g)
12. Seed index (g)
13. Ginning outturn (%)
14. Fibre quality from pooled samples across the replication on 2.5% span length (mm), Micronaire and Bundle strength
15. Pest and disease incidence by entomologists / pathologists before spraying

Br. 06 b – Initial Evaluation of Compact genotypes under rainfed condition

Design: R.B.D.

Reps: 3

Rows: 3

Row Length: 6.0 m

Spacing: 60.0 cm X 15.0 cm

Seed quantity: 300 g X 6+1

S. No.	Genotype	Sponsor	Location	Local Check (2)
1.	AKH-13-55	PDKV, Akola	Akola	AKH 8828
2.	BS 30	OUAT, Bhawanipatna	Nanded	NH 615
3.	DSC-1651	UAS Dharwad	Surat	G.Cot.20
4.	ARBC-1651	UAS Arabhavi	Kovilpatti	KC 3
5.	CNH 15	CICR, Nagpur	Nandyal	Siva Nandi
6.	CNH 75	CICR, Nagpur	Dharwad	ARBH 813
7.	CNH 09-4	CICR, Nagpur		
8.	CNH 09-62	CICR, Nagpur		
9.	CNH 1122	CICR, Nagpur		
10.	CNH 1123	CICR, Nagpur		
11.	RAHC 1020	UAS, Raichur		
12.	RAHC 1021	UAS, Raichur		
13.	CCH 16-7	CICR, Coimbatore		
14.	CCH 16-8	CICR, Coimbatore		
15.	LHDP 2	Lam, Guntur		
16.	LC (Coded at closer spacing)			

1. Seed cotton yield (kg/ha) at 130 DAS
2. Seed cotton yield (kg/ha) at 160 DAS
3. Total Seed cotton yield (kg/ha) at 160 DAS (1+2 above)
4. Percentage contribution of yield at 130 DAS
5. No. of bolls/m²
6. Plant height (cm)
7. Days to 1st boll bursting
8. No. of monopodia / plant
9. No. of sympodia / plant
10. Boll weight (g/boll)
11. Lint index (g)
12. Seed index (g)
13. Ginning outturn (%)
14. Fibre quality from pooled samples across the replication on 2.5% span length (mm), Micronaire and Bundle strength
15. Pest and disease incidence by entomologists / pathologists before spraying

Br 12 a. IET OF *G. barbadense*

Design: RBD; Row: 2 (6 m length); Reps: 4; Seed qty: 75 g X 5+2

S. No	Name of Entry	Sponsor	Locations
1.	CCB 51	CICR, Coimbatore	Surat
2.	CCB 143	CICR, Coimbatore	Rahuri
3.	DB-1601	UAS Dharwad	Coimbatore
4.	DB-1602	UAS Dharwad	Dharwad
5.	RHCb-1014	MPKV, Rahuri	Lam
6.	SB SG 1-5	SIMA, Coimbatore	
7.	Suvin (CC)		

Br. 15 a - PHT- Interspecific -Hybrid (hir x barb)

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 150 g X 8

S. No	Name of Entry	Sponsor	Locations	LC (2)
1.	CCHB 20	CICR, Coimbatore	Anand	G.Cot.Hy.102
2.	DHB-1601	UAS Dharwad	Rahuri	Phule 388
3.	DHB-1602	UAS Dharwad	Banswara	DCH 32
4.	ARBHB-1601	UAS Arabhavi	Lam	TCHB 213
5.	ARBHB-1602	UAS Arabhavi	Dharwad	DHB 915
6.	LAHB- 1	ANGRAU, Lam	Coimbatore	TCHB 213
7.	DCH 32 (CC)		Chamrajnagar	DHB 915
8.	LC		Dharwad (KSSC)	DHB 915

Br. 22 a/b IET-G. arboreum

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 120 g X 16 + 2

S. No	Entry	Sponsored by	Locations	LC (2)
1.	AKA-2013-21	PDKV, Akola	SGNR	RG 8
2.	PBD 10	PAU, Bathinda	Faridkot	LD 949
3.	PBD 20	PAU, Bathinda	Kanpur	RG 8
4.	DWDa-1601	UAS Dharwad	Bathinda	LD 949
5.	DWDa-1602	UAS Dharwad	Hisar	HD 432
6.	FDK 265	PAU, Faridkot	Sirsa (C)	CISA 310
7.	FDK 272	PAU, Faridkot	Bharuch (CSSRI)	G. Cot. 19
8.	GAM 223	JAU, Amreli	Amreli	G.Cot.19
9.	GAM 236	JAU, Amreli	Akola	AKA. 8
10.	HD 521	CCS HAU, Hisar	Parbhani	PA 402
11.	JLA-1110	MPKV, Jalgaon	Jalgaon	JLA 794
12.	JLA-1122	MPKV, Jalgaon	CICR, Nagpur	AKA. 8
13.	MBDCV-1604	MSSCL, Akola	Dharwad	AK 235
14.	CNA 2030	CICR, Nagpur	Raichur	AK 235
15.	CNA 1031	CICR, Nagpur	Nandyal	Yaganti
16.	PA 810	VNMKV, Parbhani	Kovilpatti	K. 11
17.	PA 828	VNMKV, Parbhani		
18.	RAAS 601	UAS, Raichur		
19.	RAAS 602	UAS, Raichur		
20.	CNA 1032	CICR, Nagpur		
21.	CISA 17-93	CICR, Sirsa		
22.	CISA 33-3	CICR, Sirsa		
23.	RG 801	ARS, Sriganaganagar		
24.	RG 808	ARS, Sriganaganagar		
25.	ZC (FDK 124/AKA 7/DLSa 17)			
26.	LC			

Br. 22 a/b IET - Long linted *G. arboreum*

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 120 g X 5

S. No	Entry	Sponsored by	Locations	Local Check (2)
1.	PA 741	VNMKV, Parbhani	Sirsa (C)	CISA 310
2.	PA 760	VNMKV, Parbhani	Parbhani	PA 402
3.	PA 781	VNMKV, Parbhani	Amreli	G. Cot. 19
4.	PA 788	VNMKV, Parbhani	Nandyal	Yaganthi
5.	PA 827	VNMKV, Parbhani	Dharwad	AK 235
6.	PA 363	VNMKV, Parbhani		
7.	PA 793	VNMKV, Parbhani		
8.	PA 796	VNMKV, Parbhani		
9.	PAIG 368	VNMKV, Parbhani		
10.	PAIG 326	VNMKV, Parbhani		
11.	PAIG 77	VNMKV, Parbhani		
12.	PAIG 373	VNMKV, Parbhani		
13.	PA 808	VNMKV, Parbhani		
14.	PA 778	VNMKV, Parbhani		
15.	PA 08	Check 1		
16.	PA 255	Check 2		
17.	ZC (FDK 124/AKA 7/DLSa 17)			
18.	Local Check			

Br. 25 a/b PHT - Desi Hybrid

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 100 g X 13

S. No	Name of Entry	Sponsor	Locations	LC (2)
1.	AKDH-102	PKV, Akola	Sriganganagar	RAJ DH. 9
2.	GSGDH 528	NAU-Surat	Faridkot	FMDH 9
3.	AAH 38	CCS HAU, Hisar	Bhatinda	FMDH 9
4.	KR-111	Shakti Vardhak	Hisar	AAH 1
5.	KR-116	Shakti Vardhak	Arya Nagar (Shakti Vardhak)	AAH 1
6.	CISAA 16-1	CICR, Sirsa	Sirsa (C)	CICR-2
7.	CISAA 16-2	CICR, Sirsa	Surat	G.Cot.MDH-11
8.	AJAH-101	Ajeet Seeds	Amreli	G.Cot.MDH-11
9.	BDAA 029	Bioseeds	Bharuch	G.Cot.MDH-11
10.	NACH 461	Nirmal Seeds	Akola	PDKVDH.1
11.	LC		Parbhani	PDKVDH.1
12.	ZC (KR 64-NZ; NACH 12-CZ)		Bilda (Bioseeds)	PDKVDH.1
13.			Pachora (Nirmal)	PDKVDH.1

Br. 32b IET of *G. herbaceum*

Design: RBD; Rows: 2 (6 m length); Reps: 3; Seed Qty: 120 g X 5 + 2

S.No	Name of Entry	Sponsor	Locations	LC (2)
1.	DWDh-1601	UAS Dharwad	Surat	GN.Cot.25
2.	DWDh-1602	UAS Dharwad	Bharuch	GN.Cot.25
3.	ANGh-1601	UAS Annigeri	Dharwad	Jayadhar
4.	ANGh-1602	UAS Annigeri	Raichur	RAHS 14
5.	GShv 362/12	NAU-Surat	Viramgam	ADC 1
6.	GShv 367/12	NAU-Surat	Bharauch (CSSRI)	GN.Cot.25
7.	GShv 371/12	NAU-Surat		
8.	GShv 385/12	NAU-Surat		
9.	GBhv-302	NAU-Bharuch		
10.	GBhv-304	NAU-Bharuch		
11.	GBhv-305	NAU-Bharuch		
12.	GBhv-307	NAU-Bharuch		
13.	RAHS 801	UAS, Raichur		
14.	RAHS 802	UAS, Raichur		
15.	RAHS 803	UAS, B' Gudi		
16.	RAHS 804	UAS, B' Gudi		
17.	ZC (G Cot 23/DDhc 11)			
18.	LC			

NORTH ZONE TRIAL

Br-03 a

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 500 g X 6

Entries promoted	Entries retained	Location	Local Check
HS 296	RS 2765	Sriganganagar	RS-2013
RS 2815	Shakti Sultan (SSGR105)	Kanpur	Vikas
ZC (F 2228)	HS 294	Faridkot	LH 2108
Quality Check (F 2164)	F 2501	Bathinda	LH 2108
LC		Hisar	H 1236
		Sirsa – HAU	H 1236

Br-05a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 6

New Entries	Old Entries	Location	Local Check
FHH 298	GTHH-217	Sriganganagar	Maru vikas
SVHH-151 (Shakti Vardhak)	FHH 269	Bathinda	LHH 144
CSHG 1675	FHH 272	Faridkot	LHH 144
CSHH 3078	RAHH 630	Hisar	HHH 223
HHH 497	25D14	Sirsa (C)	CSHH 243
ZC (CSHH198)	FHH 261	Arya Nagar (Shakti Vardhak)	CSHH 243
Local Check	HSHH 32		

Br-06a

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 700 g X 5

Spacing: 67.5 X 10 cm (NZ)

Entries promoted	Entries retained	Location	Local Check
RS 2814	RS 2727	Sriganganagar	RS 875
RS 2821	RS 2734	Faridkot	F 2383
	PBH 3	Hisar	H 1098-i
	Local Check	Bhatinda	F 2383
		Sirsa (CICR)	H 1098-i

(Data to be recorded – same as per National Trial)

Br-24 a

Design: RBD; Reps: 4; Rows: 4 (6 m length); Seed qty: 250 g X 5

Entries promoted	Entries retained	Location	Local Check
PBD 17	CISA 6-2	Sriganganagar	RG 8
PA 812	LD 1026	Hisar	HD-432
		Faridkot	LD 949
	ZC (FDK 124)	Bhatinda	LD 949
	LC	Sirsa (CICR)	CICR-3

Br-25 a

Design: RBD; Reps: 4; Rows: 4 (6 m length); Seed qty: 200 g X 6

Entries promoted	Entries retained	Location	Local Check
BDAA 011		Sriganganagar	RAJ DH. 9
GSGDH-521		Hisar	AAH 1
AAH 37		Faridkot	FMDH 9
Swadeshi 9	ZC (KR 64)	Bhatinda	FMDH 9
CISAA 14-31	LC	Abohar (Ankur)	FMDH 9
		Sirsa (CICR)	CICR-2

CENTRAL ZONE TRIAL**Br-03 a**

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 5

Entries promoted	Entries Retained	Location	Local Check
GSHV-172	GJHV 510	Surat	GN. Cot 22
BGDS 1033		Talod	GN. Cot 22
GSHV-173	ZC (RHC 0717)	Junagadh	GN. Cot 22
CPD-1501	LC	Rahuri	RHC 688
CCH 15-1	Quality Check (Suraj)	Bhawanipatna	Surabhi

Br-04 a

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 600 g X 4

Entries promoted	Entries Retained	Location	Local Check
GJHV 497		Surat	GN. Cot 22
SCS 1061		Junagadh	GN. Cot 22
CCH 14-1	ZC (RHC 0717)	Rahuri	RHC 688
Quality Check (Suraj)	LC	Bhawanipatna	Surabhi

Br-05a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 6

New Entries	Old Entries	Location	Local Check
GSHH 2759	GTHH 215	Surat	H 12
GSGHH 641	GJHH 4	Talod	H 12
GJHH-6	RHH 1125	Rahuri	Phule 492
GJHH-8	NCS 5657	Banswara	H 8
MRC 7398 (Mahyco)	GJHH-5	Junagarh	G. Cot. Hy. 12
ZC (Ankur 651)	GTHH-217	Jalna (Mahyco)	Phule 492
LC	BGDHH 697		
	BGDHH 632		
	RHH-1215		

Br-06a

Design: RBD; Reps: 3; Rows: 8 (6 m length); Seed qty: 500 g X 4

Spacing: 60. X 15 cm (CZ)

Entries promoted	Entries retained	Location	Local Check
DSC-1501	GISV 272	Talod	G.Cot.20
ANGC 1502	GSHV 180	Bhawanipatna	Suraj
GTHV-13/28	GTHV 13/32	Rahuri	Phule 688
ANGC 1501	RAHC 1011	Banswara	Wagadkalyan
ARBC 1501	Local Check		
CCH 15-5			

(Data to be recorded – same as per National Trial)**Br – 13 a PVT *G. barbadense***

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 2

Entries promoted	Location
ARBB-1502	Anand
DB-1502	Rahuri
ARBB-1501	
CCB-11a	
ZC (Suvin)	

Br. 14 a – CVT *G. barbadense*

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 300 g X 2

Entries promoted	Entries retained	Location
ARBB 1402	TCB 37	Anand
ARBB 1401	ARBB-1302	Rahuri
CCB 29	ZC (Suvin)	

Br-15 a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 3

Entries promoted	Entries retained	Location	Local Check
RHB-1008	RHB 1122	Banswara	G COT HB 102
DHB-1501	RHB 1123	Anand	G COT HB 102
RHB-1243	ZC (DCH 32)	Rahuri	Phule 388
	LC		

Br-03 b

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 4

Entries promoted	Entries retained	Location	Local Check
BGDS 1033		Bharuch	G Cot 16
NDLH - 2005-4		Akola	AKH 8828
AKH-09-5	ZC (NH 615)	Nanded	NH 545
BGDS 1055	LC	Banswara	Wagad Kalyan
ARBH-1551	Quality Check (Suraj)		

Br-04 b

Design: RBD; Reps: 5; Rows: 8 (6 m length); Seed qty: 400 g X 4

Entries promoted	Entries retained	Location	Local Check
SCS 1207		Bharuch	G Cot 16
SCS 1061		Akola	AKH 8828
GBHV 183	ZC (NH 615)	Nanded	NH 545
GTHV 13/17	Local Check	Banswara	Wagad Kalyan
RAH 1066	Quality Check (Suraj)		

Br-05 b

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 5

New Entries	Old Entries	Location	Local Check
NHH 440	GTHH 217	Nanded	NHH 44
CAHH-297	GTHH-215	Akola	PKV Hy 2
ACH 151 (Ajeet Seeds)	RAHH 630	Bharauch	G. Cot. Hy. 12
ZC (Ankur 651)	NCS 5657	Hansot	G.Cot.Hy.12
LC	NHH 719	Gangapur (Ajeet Seeds)	NHH 44
	ACH-151		

Br-06b

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 500 g X 3

Spacing: 60. X 15 cm (CZ)

Entries promoted	Entries retained	Location	Local Check
GTHV-13/32	ANGC 1451	Akola	AKH 8828
GISV -272	ANGC 1452	Nanded	NH 615
GSHV-180		Surat	G.Cot.20
RAHC 1019	Local Check		
CCH 15-8			

(Data to be recorded – same as per National Trial)

Br-24 b

Design: RBD; Reps: 4; Rows: 4 (6 m length); Seed qty: 200 g X 5

Entries promoted	Entries retained	Location	Local Check
JLA-0906	JLA 0614	Amreli	G Cot 19
GAM-235	NDLA 3068	Akola	AKA 8
GAM-231	PA 785	Jalgaon	JLA 794
PA 801	ZC (AKA 7)	Parbhani	PA 402
PA 812	LC	Junagarh	G Cot 19
CSA 1028			

Br-25 b

Design: RBD; Reps: 4; Rows: 4 (6 m length); Seed qty: 150 g X 7

Entries promoted	Entries retained	Location	Local Check
BDAA 011		Amreli	G Cot MDH 11
GSGDH-521		Bilda (Bioseeds)	PKV Suvarna
AAH 37		Akola	PKV Suvarna
PKV DH 1 (ZC)		Jalgaon	JLA 794
LC		Parbhani	PKV Suvarna
		Junagarh	G Cot MDH 11

SOUTH ZONE TRIAL

Br-03 a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 4

Entries promoted	Entries retained	Location	Local Check
CPD-1501		Arabhavi	ARBH 813
RB-602		Lam	L 604
BGDS 1055		Srivilliputhur	SVPR 4
BGDS 1033	ZC (Suraj)	Raichur	SCS 793
GSHV-173	LC		
RAH 1069			
CCH 15-1			
TCH 1716			

Br-04a

Design: RBD; Reps: 4; Rows: 8 (6 m length); Seed qty: 400 g X 4

Entries promoted	Entries retained	Location	Local Check
GSHV 177		Arabhavi	ARBH 813
GJHV 497		Lam	L 604
Shakti Sultan (SSGR105)	ZC (Suraj)	Srivilliputhur	SVPR 4
CCH 14-1	LC	Raichur	SCS 793

Br-05a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 6

New Entries	Old Entries	Location	Local Check
DHH-1601	SHH 902	Raichur	DHH 11
ARBHH-1601	NCS 5657	Lam	LAHH 5
ARBHH-1602	LAHH 26	B' Gudi	DHH 11
RAHH 690	LAHH 25	Srivilliputhur	Mallika
RAHH 691	GJHH-5	Dharwad (KSSC)	DHH 11
BGDHH 692	BGDHH 697	Chamrajnagar	DHH 11
BGDHH 693	GTHH-217		
MRC 7398 (Mahyco)	LAHH 29		
ZC (Bunny)	RHH-1215		
LC			

Br-06a

Design: RBD; Reps: 3; Rows: 8 (6 m length); Seed qty: 500 g X 5
Spacing: 60. X 15 cm (SZ)

Entries promoted	Entries retained	Location	Local Check
RS 2821	RAHC 1012	Srivilliputtur	Suraj
LHDP 1	GTHV 13/32	Arabhavi	ARBH 813
RS 2814		Lam	L 604
DSC-1501	Local Check	Raichur	RAH 100
RAHC 1017		Mudhol	L 604
CCH 15-5			

(Data to be recorded – same as per National Trial)

Br – 13 a PVT *G. barbadense*

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 3

Entries promoted	Entries retained	Location
ARBB-1501	CCB 29	Coimbatore (TNAU)
DB-1502	ARBB 1401	Dharwad
DB-1501	ARBB 1402	Lam
ARBB-1502	ZC (Suvin)	
CCB-11a		

Br-15 a

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 150 g X 5

Entries promoted	Entries retained	Location	LC
RHB-1243	DHB 1012	Dharwad	DHB 915
DHB-1501	DHB 1009	Coimbatore	TCHB 213
RHB-1008	RHB 1122	Lam	TCHB 213
	LC	Dharwad (KSSC)	DHB 915
	ZC (DCH 32)	Chamrajnagar	DHB 915

Br-03b

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 3

Entries promoted	Entries retained	Location	Local Check
NDLH - 2028-2	SCS 1061	Dharwad	ARBH 813
ARBH-1551	GTHV 13/17	Nandyal	Sivanandi
BGDS 1033	GBHV 183	Perambalur	KC 3
AKH-09-5	QC (Suraj)		
GBHV-195	ZC (Sahana)		
	LC		

Br-05b

Design: RBD; Reps: 4; Rows: 4 (6 m length); Seed qty: 200 g X 3

Entries	Old Entries	Location	Local Check
DHH-1651	GTHH 217	Dharwad	DHH 11
DHH-1652	NCS 5657	Nandyal	LAHH 5
ARBHH-1651	GTHH-215	Perambalur	Mallika
RAHH 690	RAHH 630		
RAHH 691	ACH-151		
BGDHH 692	NCS 5657		
BGDHH 693	ZC (Bunny)		
	LC		

Br-06b

Design: RBD; Reps: 3; Rows: 8 (6 m length); Seed qty: 500 g X 4

Spacing: 60. X 15 cm (SZ)

Entries promoted	Entries retained	Location	Local Check
ARBC 1551	ANGC 1452	Perambalur	Suraj
LHDP 1	DSC-1351	Nandyal	Siva Nandi
GTHV-13/32		Dharwad	ARBH 813
GISV -272		Mudhol	L 604
GSHV-180	Local Check		
CCH 15-8			

(Data to be recorded – same as per National Trial)

Br-24 b

Design: RBD; Reps: 3; Rows: 4 (6 m length); Seed qty: 200 g X 3

Entries promoted	Entries retained	Location	Local Check
GAM-235	AKA 2008-7	Dharwad	AKA 235
DWDa-1502	GAM 219	Nandyal	Yaganti
DWDa-1501		Kovilpatti	K 11
ARBa-1501	ZC (DLSa 17)		
PA 812	LC		
PA 801			

ENTRIES PROPOSED FOR AGRONOMY TRIAL

Zone	Species	Variety / Hybrid	Irrigated / Rainfed	Entries
North Zone	<i>G. hirsutum</i>	Variety	Irrigated	F 2296, Su Flum
	<i>G. hirsutum</i>	Compact variety	Irrigated	RS 2718, H 1465
	<i>G. hirsutum</i>	Hybrid	Irrigated	HHH 494, CSHH-2012
Central Zone	<i>G. hirsutum</i>	Variety	Irrigated	TCH 1777, BGDS 1063, CCH 12-2, GJHV 516
		Compact variety	Irrigated	ARBC-1301
		Hybrid	Irrigated	RHH-1007, RHH-1015
	<i>G. barbadense</i>	Variety	Irrigated	GSB 43
	<i>Hir x Barb</i>	Hybrid	Irrigated	RHB-1014
	<i>G. hirsutum</i>	Variety	Rainfed	CCH 12-3, BGDS 1063
		Compact variety	Rainfed	DSC-1352
		Hybrid	Rainfed	GSHH-2595, NHH 715
	Desi Hybrid	Hybrid	Rainfed	NACH 433
	South Zone	<i>G. hirsutum</i>	Variety	Irrigated
Compact variety			Irrigated	ARBC-1301, DSC-1302
Hybrid			Irrigated	BGDHH 821, RHH-1007, SHH 818
<i>G. barbadense</i>		Variety	Irrigated	GSB-44
<i>Hir x Barb</i>		Hybrid	Irrigated	RHB-1014
<i>G. hirsutum</i>		Variety	Rainfed	IH 11
		Compact variety	Rainfed	SCS 1206
		Hybrid	Rainfed	NHH 715
<i>G. arboreum</i>		Variety	Rainfed	JLA-0603, PA 740

All the breeders of the above varieties / hybrids are requested to submit 1.0 kg (variety)/0.5 kg (hybrid) of **seeds directly to the concerned agronomists (and not to Project Coordinator)** and to keep track with the agronomists for getting the data on agronomy trial and to submit the lint samples to CIRCOT from concerned location. The agronomists are requested to submit **6 kg of lint samples for full scale spinning directly to Director, CIRCOT, Mumbai (Door Delivery only, not by Railways)**. Further, agronomists are requested to send the agronomic trials data to the concerned breeder in addition to the Principal Investigator (Agronomy) in time to facilitate the breeder to submit the release proposals before due date.

Agronomy, Physiology & Biochemistry Panel

Date: 08/04/2016

Chairman	:	Dr. M. K. Arvadia, Principal, NMCA, NAU, Navsari
Co-Chairman	:	Dr. N. Gopalakrishnan, Former ADG (CC) Dr. Blaise Desouza, Head, Crop Production, CICR, Nagpur Dr. M. V. Venugopalan, Head, PME Cell, CICR, Nagpur
Convener	:	Dr. K. Sankaranarayanan, PI (Agronomy), Sriganaganagar
Rapporteurs	:	Dr. S. Ratnakumari, ANGRAU, RARS, Lam, Guntur Dr. K. B. Sankat, NAU, Surat

The Agronomy Panel Meeting of AICRP on Cotton was held in the morning session on 08.04.2016 and for presentation of results of 2015-16 and finalization of the technical programme on Agronomy, Physiology and Biochemistry trials to be conducted during 2016-17. The session was chaired by Dr. M. K. Arvadia, Principal, NMCA, NAU, Navsari and Co-chaired by Dr. N. Gopalakrishnan, Former ADG (Commercial crops), Dr. Blaise Desouza, Head, Division of Crop Production, CICR, Nagpur and Dr. M. V. Venugopalan, Principal Scientist, ICAR-CICR, Nagpur. Dr. S. Ratnakumari, Pr. Sci, Guntur and Dr. K. B. Sankat, NAU, Surat acted as rapporteurs for the sessions. Research experiments in Agronomy, Physiology and Biochemistry during 2016-17 have been formulated on the following thematic areas:

- Agronomic requirements of promising pre-release/recently released *hirsutum*/ *arboreum*/*barbadense* genotypes including compact / hybrids of both interspecific intra *hirsutum* cotton
- Developing suitable Agronomy for Bt cotton hybrids of the region.
- Weed management
- Improving use efficiency of inputs
- Technology for organic Cotton Production
- Physiological and biochemical aspects in cotton production

TECHNICAL PROGRAMME FOR 2016-17

AGRONOMY

Agronomy IA: Agronomic requirements of promising pre-release/ recently released *hirsutum* /*arboreum* genotypes/ hybrids of cotton

Agronomy 1B: Evaluation of compact culture under HDPS with different nutrient levels.

Agronomy II: Developing suitable Agronomy for *Bt* hybrids of the region

Agronomy III: Weed Management in cotton

Agronomy IV: Improving use efficiency of inputs

Agronomy V: Technology for organic cotton Production.

Agronomy VI. Exploiting the potential of sub soiling in cotton cultivation

Agronomy VII. Evaluation of *hirsutum* Bt entries under HDPS

Agronomy VIII. Evaluation of Desi cotton entries under HDPS

Agronomy IX. Studies on rooting pattern of Bt / non Bt and Desi cotton

Agronomy X. Paid up trial

PHYSIOLOGY and BIOCHEMISTRY

PHY1: Screening of cotton genotypes for abiotic stress tolerance

1a: Screening genotypes for water stress tolerance

1b: Screening genotypes for salinity stress tolerance

PHY2: Preparing for Climate Change: Effect of environment on crop phenology development and yield

PHY3.Evaluation of effect of *nano* fertilizer on growth and production of cotton (HDPS)

Bio Chem.1. Evaluation of cotton genotypes for seed oil, gossypol and protein.

Technical Programme for 2016 -17

COTTON AGRONOMY

The details of Technical Programme formulated under Agronomy are presented as under:

AgronomyIA: Agronomic requirements of promising pre-release/ recently released *hirsutum/barbadense/ arboreum* genotypes/ hybrids of Cotton

Under this project, the pre-released varieties/hybrids developed and suggested by the breeding panel under irrigated/rainfed conditions shall be tested at respective centers in the zone for their response to optimum fertilizer levels and crop geometry requirements (applicable to both public & private sector varieties/hybrids). All the participating centers shall invariably conduct these trials incorporating the new genotypes /hybrids against the local check for determining the optimum spacing and fertilizer requirements. In addition, centers can take up agronomic requirements of any promising entry as per local requirements/needs after obtaining prior approval from the Project Coordinator, CICR, Coimbatore.

North Zone

North Zone		
Zone/Centers	Hirsutum vars.	Hirsutum hybrids
Faridkot(I)	F 2296, Su Flum	HHH 494, CSHH-2012
Bathinda(I)	F 2296, Su Flum	HHH 494, CSHH-2012
Hisar(I)	F 2296, Su Flum	HHH 494, CSHH-2012
Sriganganagar(I)	F 2296, Su Flum	HHH 494, CSHH-2012

Central Zone

Central Zone					
Zone/Centers	Hirsutum vars.	Hirsutum hybrids	Barbadense vars	Hir. x barb	Desi hybrid
Akola (R)		GSHH-2595, NHH 715			NACH433
Nanded (R)	CCH 12-3, BGDS 1063	GSHH-2595, NHH 715			
Rahuri (I)	TCH 1777, BGDS 1063, CCH 12-2, GJHV 516	RHH-1007, RHH-1015		RHB-1014	
Surat (I)	TCH 1777, BGDS 1063, CCH 12-2, GJHV 516	RHH-1007, RHH-1015	GSB 43	RHB-1014	
Junagarh (I)	TCH 1777, BGDS 1063, CCH 12-2	RHH-1007, RHH-1015	GSB 43	RHB-1014	
Bhwanipatna (R)	CCH 12-3, BGDS 1063				NACH433

South Zone

Southern Zone					
Zone/Centers	Hirsutum vars.	Hirsutum hybrids	Barbadense. Vars	Arbor. Var	HxB
Dharwad (R)	IH -11	NHH-715		JLA-0603, PA 740	
Coimbatore(I)	HS 292, TSH-04/115, CCH- 12-2	BGDHH-821, RHH-1007, SHH-818	GSB-44		RHB-1014
Lam (I)	HS -292, TSH-04/115, CCH- 12-2	BGDHH-821, RHH-1007, SHH-818			
Raichur (I)		BGDHH-821, RHH-1007, SHH-818	GSB-44		RHB-1014
Chamarajanagar(R.)	IH -11	NHH-715			
Nandyal (R)	IH -11	NHH-715		JLA-0603, PA 740	
Mudhol				JLA-0603, PA 740	

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest,3.No of Sympodia at harvest, 4.Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha)

Statistics:1. Standard Deviation, 2.Critical Difference, 3. Coefficient variation

Data should be reported in interaction tables in above said parameters to find out optimum spacing and fertilizer level requirement of each entry, which is warranted for release

Agron 1B: Evaluation of compact culture under HDPS with different nutrient levels.

	North zone	Central Zone		South Zone	
Locations	Hisar Sriganganagar (I)	Surat & Rahuri (I)	Akola Bhwanipatna & Nanded (R)	Coimbatore Raichur, Lam,& Srivilliputtur (I)	Nandyal &Chamarajanagar, Dharwad (R)
Entries	RS 2718, H 1465	ARBC-1301	DSC-1352	ARBC-1301, DSC-1302	SCS 1206
Spacing (cm)	67.5x15 67.5x 20 100x10	60x10 75x10 90x10	45x10 60x10 75x10	60x10 75 x 10 90x 10	45x10 60x10 75x10
Fertilizer levels	RDF State Rec., 125% of RDF & 150% of RDF	RDF State Rec, 125% of RDF & 150% of RDF	RDF State Rec, 125% of RDF & 150% of RDF	RDF State Rec, 125% of RDF & 150% of RDF	RDF State Rec, 125% of RDF & 150% of RDF
Design	FRBD/Split	FRBD/Split	FRBD/Split	FRBD/Split	FRBD/Split

Note: Conventional spacing (third spacing) of respective region will be included for evaluation to assess the architectural changes due to spacing should be mentioned in the results.

All the breeders of the above varieties / hybrids are requested to submit 1.0 kg (variety)/0.5 kg (hybrid) and 2.0 kg for variety HDPS and 1.0 kg for hybrids HDPS of **seeds directly to the concerned agronomists (not to Project Coordinator)** and to keep track with the agronomists for getting the data on agronomy trial and to submit the lint samples to CIRCOT from concerned location. The agronomists are requested to submit the 6 kg lint samples directly for micro-spinning to Director, CIRCOT, Mumbai (**Door Delivery only and not by Railway Parcel**). Further, agronomists are requested to send the agronomic trials data (interaction tables) to the concerned breeder in addition to the Principal Investigator (Agronomy) in time to facilitate the breeder to submit the release proposals before due date.

Action to be taken:

1. These varieties/hybrids have been recommended by the Breeding panel after ascertaining their performance.
2. Concerned Breeders shall send the required Seeds directly to the Agronomists of respective Centers without delay for taking up experiments.
3. One or two centers may send lint samples for full scale spinning (To be intimated later).
4. Entomology & pathology data will be collected from entomologist & pathologist of AICRP (cotton)

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest, 4. Average sympodial length (cm), 5. Boll per sq meter, 6. Boll weight (g), 7. Final Plant population (no /net plot), 8. Seed cotton Yield (kg/ha) 9. Architectural changes due to spacing

Statistics: 1. Standard Deviation, 2. Critical Difference, 3. Coefficient variation

Data should be reported in interaction tables in above said parameters to find out optimum spacing and fertilizer level requirement of each entry

Agronomy II: Developing suitable Agronomy for *Bt* hybrids of the region

Treatments:

- T1. *Bt* hybrid
- T2. T1+Closer spacing (25% less than Rec.)
- T3. T2+125 % of Rec.Nutrients
- T4. T3 + recommended foliar spray
- T5. T4+ micro nutrients (Soil application)
- T6. T4+ location specific measures for control of reddening

Note: Approved *Bt* entries should be selected.

Design: RBD

Replications: Four

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest, 4. Boll per sq meter, 5. Boll weight (g), 6. Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha)

Statistics: 1. Standard Deviation, 2. Critical Difference, 3. Coefficient variation

All AICCIP centers except Lam, Dharwad & Bhawanipatna, and North zone

Agronomy III: Weed Management in Cotton

Treatment Schedule

- T₁: Pendimethalin @ 0.75 to 1.0 kg a.i/ha as Pre em.or PPI + one hoeing
T₂: Tank mixture (Quizalofopethyl 50 g a.i/ha+ Pyriithiobac Sodium @ 62.5g a.i/hat 2-4 leaf stage of weeds + one hoeing.
T₃:Chlorimuron Ethyl @ 6.0g a.i/ha as at 2-4 leaf stage weed + one hoeing
T₄: T1 + Cover crop with sunnhemp or sorghum should be sown 20 DAS of cotton
T₅: T₁+ Glyphosate @ 5 ml/litre as directed spray at 2-4 weed leaf stage (after hoeing)
T₆:T₁ + T₂
T₇: T₁+ T₃
T₈: Weed Free check
T₉: Weedy check

Design: RBD **Replication:** Three,

Centres: Banswara, Indore, Chamarajanagar & Nandyal

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest ,
4. Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha), 8. Weed count species wise (before and after executing treatment), 9.Weed dry matter production (before and after executing treatment), 10. Weed Control Efficiency.

Statistics:1. Standard Deviation,2. Critical Difference,3. Coefficient variation

Economics:1. Cost of weeding, 2. Cost of cultivation, 3. Gross return, 4. Net return, 5. Marginal benefit cost ratio.

Agronomy IV: Improving use efficiency of inputs (water and nutrients)

Moisture conservation techniques for enhancing cotton productivity under drip irrigation

Treatment Schedule

- T₁ : Control
T₂: Polymulch
T₃: News paper mulch
T₄ : Crop residue mulch (5t/ha)
T₅: Dust mulch by hoeing

Design: RBD

Replications:4 (Four)

Note: 30 micron thickness with silver colour top layer

Centers: Junagarh, Banswara, Akola, and Indore

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest,
4. Boll per sq mete, 5 Boll weight (g), 6. Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha), 8. Consumptive use (mm), 9. Quantity of water used (mm), 10. Effective rainfall (mm), 11. Water saving (mm & %), 12. Root volume (cc), 13. Soil temperature

Statistics:1. Standard Deviation,2. Critical Difference,3. Coefficient variation

Economics:1. Cost of cultivation,2. Gross return,3. Net return,4. Partial budgeting

Analysis: Water use efficiency and water productivity

Agronomy V: Technology for organic cotton Production

Treatment schedule

T1. Absolute control (No organic & Inorganic)

T2. Control (RDN through inorganic)

T3. RD of Nutrient through organic based on P equivalent basis

T4. Seed treatment and soil application of rec. bio fertilisers and foliar application of PPFM

T5. Neem cake 250 kg/ha

T6. Raising of .Sunnhemp / fodder cowpea between rows incorporated before flowering

T7. Intercropping with green gram/black gram/ ground nut/soybean

T8. T4+T5

T9. T4+T6

T10. T4+T5+T6

T11: T4+ T5 + T7

Note: *arboreum* of long linted or *hirsutum* resistant to sucking pest should be selected. This project is to be conducted on the fixed site and plant protection by organic pesticides. PPFM culture will be supplied by TNAU, Coimbatore. Entomologists and Pathologists associated with AICRP cotton has to take observation.

RBD

Replication: Three

Centers: Sriganaganagar, Kanpur, Central and South Zone centers except Chamarajanagar.

Observation

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest, 4. Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no / net plot), 7. Seed cotton Yield (kg/ha)

Statistics: 1. Standard Deviation, 2. Critical Difference, 3. Coefficient variation

Economics: 1. Cost of cultivation, 2. Gross return, 3. Net return, 4. Benefit cost ratio,

Analysis: Nutrient availability at planting and harvest & uptake; Organic carbon content (before sowing and after harvest)

Agronomy VI. Exploiting the potential of sub soiling in cotton cultivation

Treatment Schedule

T₁: Control/No sub soiling

T₂: Sub soiling at 1.0 m distance

T₃: Sub soiling at 1.5 m distance

T₄ : Cross sub soiling at 1.0m x1.0 m distance

T₅: Cross sub soiling at 1.5m x1.5 m distance

Design: RBD

Replications: 4

Centers: Faridkot, Bathinda and Surat

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest, 2. No of Monopodia at harvest, 3. No of Sympodia at harvest, 4. Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha), 8. Root length and root length density at 90-110 DAS

Statistics: 1. Standard Deviation, 2. Critical Difference, 3. Coefficient variation

Economics:1. Cost of cultivation, 2. Gross return, 3.Net return, 4. Benefit cost ratio

Effect on soil properties

- a) Bulk density at 0-15 cm and at 15-30 cm ,b) Infiltration rate (mm/hour)
c) Initial and final soil status

3. Compaction measurements with penetrometer

5. Root length and root length density at 90-110 DAS

Agron VII. Evaluation of Bt (*hirsutum*) genotypes under HDPS cultivation

Treatment Schedule

Co de	PAU-Faridkot	CIC R-Sirsa	HA U-Hisar	RAU SGN R	NA U-Surat	CICR - Nagpur	PDK V-Akola	MAU - Nanded	MPK V-Rahuri	OUAT - Bhawani patna	UAS-Dharwad	PJTSA U-Mudhol	ANGAR U-Guntur	ANGAR U-Nandyal	CIC R-Coimbatore
201	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
202	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
203	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
204	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
205	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
206	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
207	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
208	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
209	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
210	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
211	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
212	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
213	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
214						√	√	√	√			√	√		√
215						√	√	√	√			√	√		√
216						√	√	√	√			√	√		√
217						√	√	√	√			√	√		√
208						√	√	√				√	√		
219						√	√	√				√	√		
220						√	√	√							
100	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	14	14	14	14	14	21	21	21	18	14	14	20	20	14	18

Experimental details for *G. hirsutum* Bt variety trial:

Spacing - 67.5 x 30 cm at PAU Faridkot and HAU Hisar, 67.5 x 10 cm at CICR Sirsa and RAU Sriganagar. Other locations:75 cm x 10 cm

Number of Rows 8 and Row length 6 m

Plot Size

Replications- Three

Seed quantity = 350 gm of delinted and treated of each entry/ location (except HAU Hisar and PAU Faridkot where only 175 g/entry since spacing is 67.5x30 cm)

Local Check (Code no. 100) – BG II hybrid at recommended spacing of the location (to be included by the centre conducting the trial with the most popular BG II hybrid of the region)

Design: RBD

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest ,2. No of Monopodia at harvest, 3.No of Sympodia at harvest,
- 4.Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha)

Statistics:1. Standard Deviation, 2. Critical Difference, 3. Coefficient variation

Agron VIII Evaluation of Desi (*arboreum*) genotypes under HDPS cultivation

Treatment Schedule

Coded packed list of *G arboreum* genotypes for multi-location testing

Co de	PAU- Faridk ot	CIC R- Sirsa	RAU SGN R	NA U- Sur at	CICR - Nagp ur	PDK V- Akol a	MAU - Nand ed	MPK V- Rahu ri	OUAT- Bhawanipa tna	UAS- Dharw ad	PJTSA U- Mudho l	ANGAR U- Guntur	ANGAR U- Nandyal	CICR- Coimbat ore
001	√	√	√	√	√	√	√	√	√	√	√	√	√	√
002	√	√	√	√	√	√	√	√	√	√	√	√	√	√
003	√	√	√	√	√	√	√	√	√	√	√	√	√	√
004	√	√	√	√	√	√	√	√	√	√	√	√	√	√
005	√	√	√	√	√	√	√	√	√	√	√	√	√	√
006	√	√	√	√	√	√	√	√	√	√	√	√	√	√
007	√	√	√	√	√	√	√	√	√	√	√	√	√	√
008	√	√	√	√	√	√	√	√	√	√	√	√	√	√
009	√	√	√	√	√	√	√	√	√	√	√	√	√	√
010	√	√	√	√	√	√	√	√	√	√	√	√	√	√
011	√	√	√	√	√	√	√	√	√	√	√	√	√	√
012	√	√	√	√	√	√	√	√	√	√	√	√	√	√
013	√	√	√		√		√							√
014	√	√	√		√		√							√
100	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Tot al	15	15	15	13	15	13	15	13	13	13	13	13	13	15

Experimental details for *G arboreum* trial:

Spacing 60x10 cm at all locations (except Faridkot, Sirsa and Sriganganagar where the spacing would be 67.5 x10 cm)

Plot size 8 rows of 60 cm = 4.8 m

Row length- 5.0 m

Plot Size 25- m² approximately

Replications- Three

Seed quantity = 350 g per location (delinted but untreated)

Local Check (Code no. 100) – BG II hybrid at recommended spacing of the location (to be included by the centre conducting the trial with the most popular BG II hybrid of the region)

Observation to be recorded (Replication wise data to be reported)

1. Plant height (cm) at harvest ,2. No of Monopodia at harvest, 3.No of Sympodia at harvest,
- 4.Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha)

Statistics:1. Standard Deviation, 2.Critical Difference, 3. Coefficient variation

Important Note: For both the trials on Evaluation of Bt (*hirsutum*) genotypes under HDPS cultivation and Evaluation of Desi (*arboreum*) genotypes under HDPS cultivation, the nodal officer will be the Station – Incharge who is responsible for submission of data from time to time and the data on agronomic characters, pest and disease incidence (data sheet to be sent shortly by the respective PI) should be recorded by the concerned Agronomist, Entomologist and Pathologist of the station. Kindly include five rows of refugia around the Bt cotton trial plot.

Agronomy X. Studies on rooting pattern of Bt / non Bt and Desi cotton (Pot expt.)

Design: RBD **Replications:** 3

Pots/cultivar/replication = 12

Treatments: 10 cultivars

(*Bt*, corresponding Non *Bt* versions , desi cotton, non *Bt* American cotton)

1. Ankur 3028 BGII
2. Ankur 3028 Non BG
3. MRC 7017 BGII
4. MRC 7017 Non BG
5. F 2228t
6. LD 949

Total pots required = 216

Pots are to be fixed at spacing of 75 cm x 75 cm

PVC pipes of 6 inch diameter are to be used as pots. The standard length of pipe is 19ft 9inches. A total of 3 pots (i.e. 79 inches/6.6ft approx.) can be made from one standard PVC pipe length. At cutoff date, following observations are to be recorded. The pots shall be subjected to water pressure for washing out soil out to retain roots only.

Data recording: Data of following characters shall be recorded on 3 plants/replication at 4 stages starting from 60 DAS at 30 days interval (60, 90, 120 & 150 DAS):

1. Plant height, no. of branches and leaves/plant
2. Root length along with fresh and dry root weight
3. Any other relevant observation

Centres: Faridkot, Bathinda

Agronomy X. Paid up trials

Exp 1. Effect of Liquid Biostimulant on cotton growth and production

Experimental Design and Objectives: To assess the effect of Liquid Biostimulant formulation by Sea6 Energy on various parameters in Cotton crop as mentioned below:

- Plant Height (cm)
- No. of Bolls/Plant
- Boll Weight (gm)
- Yield (q/ha)
- days of 50% flowering
- days of 50% boll bursting

Treatment Details: All the treatments would be tested over and above the standard package of practice

1. Foliar Application:

- a. LBS6 @ 0.5ml/L – 25th day and 55th day after sowing
- b. LBS6 @ 1.0ml/L – 25th day and 55th day after sowing
- c. Standard package of practice

* LBS- Liquid Biostimulant by Sea6 Energy

2. Locations:

- North Zone (Faridkot, Bhatinda, Hisar and Sriganana)
- Central Zone (Akola, Nanded, Banswara, Surat)

Exp2. Testing of ELO –cotton , Z20 and Flusian on cotton growth and development of cotton

Testing of seed treatment

Centres: North Zone :Faridkot, Bathinda, Hisar & Srigananagar(both experiments)

Experimental Design: RBD

No. of treatments: 5

ELO @ 0.75g/kg; 1g/kg and 1.25g/kg of seed

Control - Standard seed treatment

Control - No seed treat

No. of replications: 4

Plot Size As per guidelines

Variety *G.hirsutum* preferably non-BT

Other practices Recommended agronomic practices to be followed. Details of all practices fertilizer application, irrigations, weed and pest management should be recorded. Information of rainfall light, medium and heavy to be documented

Observations:

Data will be recorded on five competitive plants/ plot for the following characters:

1. Plant height (cm) 10 20, 60 and 90 DAS,
2. Days to square initiation,
3. Number of bolls per plant,
4. Days to maturity,
5. Boll weight (g),
6. Yield per plant (g) and per ha
7. Harvest index (%),
8. Ginning outturn (%),
9. 2.5% span length (mm),
10. Fibre strength (g/tex),
11. Fibre fineness ($\mu\text{g}/\text{inch}$).
12. The germination (%) and days to germination will be recorded.
13. Information on key pests and diseases as per standard protocol

Experimental Design: RBD

No. of treatments: 1. Z20 @ 400g/acre + Fluisan @ 40ml/acre

2. Z20 @ 600g/acre + Fluisan @ 40ml/acre

3. Z20 @ 800g/acre + Fluisan @ 40ml/acre

4. Z20 @ 400g/acre

5. Z20 @ 600g/acre

6. Z20 @ 800g/acre

7. Control - No application

Number of application: 4 (Z20 - 3 doses with fluisa @40ml/acre as 1st application and remaining 3 applications just Z20; Z20 - 3 doses as such - 4 applications

No. of replications: 4

Plot Size As per guidelines
Variety Preferably non-BT
Variety *G.hirsutum* preferably non-BT
Other practices Recommended agronomic practices to be followed. Details of all practices fertilizer application, irrigations, weed and pest management should be recorded. Information of rainfall light, medium and heavy to be documented

Soil testing: For all major and minor elements before sowing and at harvest

Observations

Data will be recorded on five competitive plants/ plot for the following characters:

1. Plant height (cm) 60 90 ,and 120 DAS
2. Days to square initiation,
3. Number of bolls per plant
4. Days to maturity
5. Boll weight (g)-picking wise from 5 marked plants
6. Impact on weed flora
7. Yield per plant (g) and per ha
8. Harvest index (%)
9. Ginning outturn (%)
10. 2.5% span length (mm)
11. Fibre strength (g/tex)
12. Fibre fineness (µg/inch)
13. Information on key pests and diseases as per standard protocol
14. Phytotoxicity on 10 scale as per standard 90 and 150 DAS

Details of treatment application

Treatments	1st application	2nd application	3rd application	4th application
1	Z20 @ 400g/acre +Fluisan @ 40ml/acre	Z20 @ 400g/acre	Z20 @ 400g/acre	Z20 @ 400g/acre
2	Z20 @ 600g/acre +Fluisan @ 40ml/acre	Z20 @ 600g/acre	Z20 @ 600g/acre	Z20 @ 600g/acre
3	Z20 @ 800g/acre +Fluisan @ 40ml/acre	Z20 @ 800g/acre	Z20 @ 800g/acre	Z20 @ 800g/acre
4	Z20 @ 400g/acre	Z20 @ 400g/acre	Z20 @ 400g/acre	Z20 @ 400g/acre
5	Z20 @ 600g/acre	Z20 @ 600g/acre	Z20 @ 600g/acre	Z20 @ 600g/acre
6	Z20 @ 800g/acre	Z20 @ 800g/acre	Z20 @ 800g/acre	Z20 @ 800g/acre
7 Control	0	0	0	0

Applications 1st at 4-6 leaves stage and thereafter every 3 weeks till boll formation (4-5 applications in total)

Exp.3.Evaluation of SafeRock® Minerals on cotton with particular reference to its agronomical Superiority in combination with Normal Farming Practices (NFP)**EXPERIMENTAL**

DETAILS

1. DESIGN: FRBD, **2. TREATMENTS:**9 (nine) **3. REPLICATIONS:**3 (three)

4. TREATMENT DETAILS:

I.D	Treatment Details	Application Rate per Hectare	Application Stage
T1	<i>Absolute Control</i>	<i>Untreated</i>	<i>N/A</i>
T2	<i>100% SafeRock Only</i>	<i>250kg</i>	<i>At field preparation or sowing time (once)</i>
T3	<i>100% NPK Normal Farming Practices</i>	<i>Recommended rate</i>	<i>-do-</i>
T4	<i>100% SafeRock + 100% NPK Normal Practices</i>	<i>250kg + Recommended rate</i>	<i>-do-</i>
T5	<i>100% SafeRock + 75% NPK Normal Practices</i>	<i>250kg + 75% Recommended of rate</i>	<i>-do-</i>
T6	<i>100% SafeRock + 50% NPK Normal Practices</i>	<i>250kg + 50% of Recommended rate</i>	<i>-do-</i>
T7	<i>50% SafeRock + 100% NPK Normal Practices</i>	<i>125kg + 100% of Recommended rate</i>	<i>-do-</i>
T8	<i>200% SafeRock + 100% NPK Normal Practices</i>	<i>500kg + 100% of Recommended rate</i>	<i>-do-</i>
T9	<i>200% SafeRock + 50% NPK Normal Practices</i>	<i>500kg + 50% of Recommended rate</i>	<i>-do-</i>

Centres: Faridkot, Sriganaganar, Hisar, Bathinda

Observation Schedule

1. Effect on plant attributes
 - a. Plant height
 - b. No. of branches per plant
2. Effect on yield attributes and yield
 - a. No. of bolls per plant
 - b. Weight of bolls per plot
 - c. Length of fibre
 - d. Yield
 - e. C:B ratio
3. Soil analysis of NP& K prior to the experiment
4. Soil analysis of NP& K at the end of the season
5. Total yield expressed as tonnes per hectare (Imperial units may be shown in brackets immediately after)
6. Cost Benefit Analysis
7. ANOVA analysis
8. Pictures to be taken through each stage and referenced with subject (i.e., 100 SRM + 100 NPK, 50 SRM + 50 NPK, etc.) and date. *e Appli*

Exp.4. Efficacy testing of Super absorbent (UPDT) trial- protocol of UPL limited

1. Experimental design : Split plot design
2. Number of treatments : 12
3. Number of replications : 03

Treatments	NPK	Absorbent (kg/ha)	Moisture conservation practices	Remark
T1	100%	-	Insitu soil moisture	Recommended Fertilizer & Moisture Conservation
T2	100%	12.5	Insitu soil moisture	
T3	100%	25	Insitu soil moisture	
T7	50%	-	Insitu soil moisture	Reduced Fertilizer & Moisture Conservation
T9	50%	12.5	Insitu soil moisture	
T10	50%	25	Insitu soil moisture	
T4	100%	-	Rainfed control	Recommended Fertilizer & Rainfed Control
T5	100%	12.5	Rainfed control	
T6	100%	25	Rainfed control	
T8	50%	-	Rainfed control	Reduced Fertilizer & Rainfed control
T11	50%	12.5	Rainfed control	
T12	50%	25.0	Rainfed control	

Main plot

Sub plot

Sub-sub plot

- | | | |
|--------------------------------------|------------------------------|-------------------------------|
| i. Rainfed Control | i. Fert 1 (50%) | i. Absorbent 0 |
| ii. <i>In situ</i> soil moisture con | ii. Fert 2 (100%) | ii. Absorbent 1 (12.5 kg/ha) |
| | iii. Absorbent 2 (25 kg/ha) | |

Centres: Surat, Akola, Nanded and Khandwa

In situ soil moisture conservation of the locality; Which includes each furrow opening/alternate furrow opening/tied hoeing/mulching

Observations to be recorded common for all locations:

1. Soil moisture content under different treatments
2. Germination percent, growth and yield related attributes under different treatments
3. Soil and leaf nutrient contents (NPK) under different treatments & nutrient uptake
4. WUE & NUE estimates under different treatments
- Biometric observation
5. 1. Plant height (cm) at harvest ,2. No of Monopodia at harvest, 3.No of Sympodia at harvest, 4.Boll per sq meter, 5 Boll weight (g), 6 Final Plant population (no /net plot), 7. Seed cotton Yield (kg/ha)
6. **Statistics:**1. Standard Deviation, 2.Critical Difference, 3. Coefficient variation

Cotton Physiology and Biochemistry

PHY.1. Exp1: Screening of Cotton genotypes for abiotic stress tolerance

1a: Screening genotypes for water stress tolerance

Pre- released cultures +ZC +LC+Breeding trial 2a

Action: Data supply through monthly report -Centres

Seed requirement: 100g X 8 = 800g (delinted seeds). National Trial entries to be supplied to all the centres in addition to the zonal entries.

Observations:

- Seed cotton yield and ancillary data
- Phenology
- RWC, Chlorophyll stability index, Proline content, SLW, nutrient uptake
- Stress indices (PHSI, DMSI, YSI and S etc.)
- Monitoring of Periodic soil moisture profile.

Centres: Guntur, Dharwad (South); Hisar (North); Surat, Khandwa (Central),

1b: Screening genotypes for salinity stress tolerance

Centres: Lam (Pot/Microplot experiment)

Genotypes: Pre released zonal entries + 1Check + Breeding trial 2a

Action: Data supply through monthly report-Centres

Observations:

Seed cotton yield and ancillary data

Monitoring of soil salinity at initial and final stages.

Leaf Na and K content at peak flowering stage.

Action: Data supply through monthly report-Centres

Centres: Guntur, Dharwad (South Zone), Hisar (North Zone), Surat (Central Zone),

Phy 2. Preparing for Climate Change: Effect of environment on crop phenology development, yield and fiber development**Treatments:****Main Plots: 3Dates of Sowing (Rainfed)**

1. Normal Sowing
2. Late sowing by 15 days
3. Late sowing by 30 days

Irrigated

1. Early sowing
2. Normal sowing
3. Late sowing

Sub Plots: 7genotypes

1 *Bt* hybrid + 3 *hirsutum* cotton varieties of different duration (Early, Medium and late) + 3 *arboreum* cotton varieties of different duration (Early, Medium and late)

Note: Recommended date of sowing is normal date of sowing

Centers: Lam, Dharwad, Junagadh, Hisar and Surat

Design:FRBD/Split plot Replications:Three

Observations:

- Quantity of total & effective rainfall of three sowing periods
- No of days of wet spell and dry spell of three sowing periods
- Soil moisture at critical period of crop growth
- Crop Phenology with GDD and heat units

- Flowering pattern
- Biomass and its partitioning at 50 and 100 DAS
- Diseases and pest situations
- All yield and yield components
- Biochemical Observation (Dharwad, Hisar and Surat)

Phy 3. Effect of Nano Zinc and Nano-P on growth and Productivity of Cotton under high density planting

Treatment schedule

1. Rec NK
2. Rec NPK
3. T1+Foliar application of Nano P @ 0.13 g per 15 litres of water at 45DAS & 60
4. T1 + Foliar application of KH₂PO₄
5. T2 + Soil application of Zn SO₄ @ 25 kg/ha
6. T2 + Foliar application of ZnSO₄ @ 0.2% at 45DAS & 60 DAS
7. T2 + Foliar application of Nano Zinc @ 0.13 g per 15 litres of water at 45DAS & 60 DAS

- **Design: RBD Replications : 3**

Data to be Collected:

- a) Plant height (cm)
- b) Photosynthetic rate at peak flowering stage
- c) Number of sympodia and dry weight of sympodia
- d) Number bolls per sympodia
- e) Number of bolls per plant
- f) Yield and yield components
- g) Fibre quality parameters
- h) Alkaline phosphate activity

Centres: Sriganganagar, Lam and Dharwad

Bio Chem1. Evaluation of cotton genotypes for seed oil, Fatty acid profile, gossypol and protein.

Promising genotypes will be taken up for this trial.

Action: Data supply through monthly report -Centre

Source of materials: Br02a for irrigated Centre (Surat, Hissar) ;

Br02b for rainfed Centre: Dharwad

Oil estimation of all breeding trials of the respective zone (Dharwad- South Zone, Surat- Central Zone, Hisar – North Zone)

*** Based on the interactive meeting of the Hon'ble DDG (Crop Science), it has been decided to continue with seed oil estimation of all the entries in all the trials. With the approval of the Project Coordinator, it has been decided to estimate the seed oil estimation zone wise for all the trials at Hisar (North zone locations), Surat (Central zone locations) and Dharwad (South zone locations). All the breeders are requested to send the seed samples from first picked kapas to the Biochemists of the above centres for oil estimation.**

SCHEDULE OF COMMON OBSERVATIONS TO BE TAKEN UP

- Soil type (Depth of soil/soil texture)
- Irrigated/rainfed condition)
- Soil fertility status (initial)

- Periodic determination of soil moisture profile (0-15, 15-30, 30-60 cm) up to harvest in drip irrigation experiment
- Nutrient uptake at 50 % boll bursting stage
- Water productivity (based on yield & consumptive use of water)
- Nutrient/Fertilizer use efficiency (based on total uptake and yield)
- Seed cotton yield, boll no., boll weight, plant population /ha, seed yield.
- Fiber quality
- Economics analysis

SUBMISSION OF DATA ON THE TRIALS

Zone Date of submission of report

North: 31st Dec.

Central 15th January

South 31st January

Recommendation:

- Agronomic requirements of FHH 209, HSHH 31, F2381, CSH 3075 & F2383 in North Zone; SCS 1062, GISV-267, Phule-688, GBHV 180, AKH 9916, DDH1251, RHH-0917, RHH 0622, BHH 326, RHB0812, RHB0708, ARBC-19 in Central Zone; SCS-1062, BGDS-1063, SCS-793, DB 39, DB 40, RHB 0812, DHB 912 TCH-1705, LH-2298 in South Zone were worked out.
- Experiment was undertaken to develop suitable Agronomy for ruling Bt hybrids of the region were undertaken. RCH 602 and Bioseed 6588 out yielded the rest at Hisar and Sriganaganagar, respectively.
- Recommended Bt hybrid + closer spacing (25% less than Rec.) + 125% RDF + Recommended foliar spray + micronutrient soil application + location specific measures for control of reddening (T7) gave significantly higher seed cotton yield at Akola, Nanded, Junagarh and Indore
- Different drip irrigation schedules were tried and results indicated that 0.6 ET at Lam, 0.8 ET at Faridkot and 1.0 ET at Rahuri and Banswara gave significantly higher seed cotton yield.
- Cross sub soiling at 1.0m x 1.0 m distance gave significantly higher seed cotton yield at Faridkot, Bhatinda and Abohar
- The entries viz; L 603, BS 39, AKH09-5, SCS 1213, CNH 1110, L 770 and RAH 806 recorded higher seed cotton yield under rainfed conditions and expressed more than two contributing characters of drought tolerance in addition to yield attributing characters.
- Three genotypes viz., TSH-04/115, ND LH-1943 and ND LH-1938 had on par yield under irrigated and rainfed condition at Dharwad. G.Cot-16, GSHV-177 and AKH-095 recorded higher (12% more than average) yield under stress at Surat.
- Delay in sowing by every 10 days from 1st June, resulted in reduction of seed cotton yield and the extent of reduction between successive ten days varied between 9.68 to 37.32% at Dharwad.

The following personnel of various coordinating centers participated in the deliberations and finalization of technical programme in the coming season (2016-17).

S.No.	Name, Designation and Centre	Mobile No.
1.	Dr M.K.Arvidia, Principal,NMCA,NAU,Navsari	8427441177
2.	DrN.Gopalakrishnan, Former ADG(Commercial crops)	9999071941
3.	Dr. M.V. Venugopalan, Pr. Scientist, CICR, Nagpur	09970361057
4.	Dr.K.Sankaranarayanan Principal scientist CICR, CBE	9842215681
5.	Dr. P.L. Nehra, P.I., Agronomy, Sriganaganagar	09413714828
6.	Dr. Blaise D'Souza	9822567062
7.	Dr Kulvir Singh Agronomist Regional Station Faridkot	09417783052
8.	Dr. SudeepMalik,Sr. Agronomist, PAU, RS, Bathinda	09417732999
9.	Dr. Manpreet Singh Asst Agronomist PAU RRS, Abohar	8437700130
10.	Dr. Harjeet Singh Brar Asst. Agronomist PAU RS Bathinda	8427441177
11.	Dr. G. K. Kataria, Plant Physiologist JAU, Junagarh	9879574294
12.	Prof. K. B. Sankat, Asst. Res. Scientist, NAU, Surat	9725018842
13.	Prof. M. L. Patel, Baruch	9427101097
14.	R. S. S. Tomar, Sr. Scientist, Indore	9302123610
15.	Dr. S. M. Dhadge, Cotton Agronomist, Rahuri	9623688251
16.	Dr. A.N.Paslawar Agronomist PAU RS Akola	9822220272
17.	Dr. B.S. Nayak, Asstt. Agron., AICCIP, Bhawaipatra	09437321675
18.	Dr. S. RatnaKumari, Pri. Scientist (Phy.) RARS, Lam, ANGRAU	09491610843
19.	Dr. S. Bharathi, Sr. Scientist (Agro) RARS, Lam, ANGRAU	09490723412
20.	DrAjaya Kumar M.Y UAS Raichur	09880398690
21.	Dr. Jagdish Kumar, CSA, University Kanpur	09450131189
22.	Dr V.L.Kikani, ARS, CRS, Junagarh	09898590750
23.	Dr V.K Vekariya, Asst. Biochemist MCRS NAU, Surat	09712913345
24.	Prof. Arvind D. Pandagale, Asstt. Agronomist, CRS, Nanded	07588581713
25.	Dr. U.V.Mumurigatti, principal scientist(physiology) ARS, Dharwad	09480370052
26.	Dr. H.M. Vamadevaiah, Pri. Scientist (Biochemist) ARS, UAS, Dharwad	09449792098
27.	Dr. Y.R. Aladakatti, Sr. Sci. (Agro.), ARS, Dharwad	09448861040
28.	Dr. KarmalsinghAsst Agronomist CCHAU Hisar	09812700110
29.	Dr Subodh Bishnoi, Physiologist, Sriganaganagar	08058626129
30.	Dr. ShiwaniMandhania, Asstt. Biochemist, HAU, Hissar	09466812467
31.	Sh.Sushil Gather Godrej Agrovvet Ltd	9716035271
32.	Dr. B.G. Shekhara Professor (agronomy)	9900618898
33.	Chetan k Prajapati,	9978429369
34.	B R Baraiya, Scientist (Physiology), Khandwa	8065370614
35.	SachinKhandelwal, Process Dev. Engg.	8971491306
36.	Dr. Usharani, CICR, CBE	9843298422
37.	Dr. H. R. Ramani, Asst. Res. Scientist (Bio-chem), MCRS, Surat	9998380285
38.	Dr. (Mrs) SubbalakshmiLokanadhan, Professor (Agronomy), Dept. of Cotton, TNAU, Coimbatore	9443899124
39.	Dr. (Mrs) Chelviramessh, Asst. Professor (Agronomy), CRS, Srivilliputtur	9443185237

Entomology Panel

Date: 09/04/2016

Chairman : Dr. K. G. Patel, Principal, COA, NAU, Bharuch
Co-Chairman : Dr. Sandhya Kranthi, Head, Crop Protection Division, CICR, Nagpur
Convener : Dr (Mrs) B. Dharajothi, PI (Entomology)
Rapporteurs : Dr. Rishi Kumar, Sr Scientist, CICR, Sirsa
Dr. S. S. Udikeri, Principal Scientist (Entomology), Dharwad

The Entomology session of AICRP Cotton was held on 8th Feb, 2016, where researchers from public and private companies were participated. Dr K.G.Patel, Principal, COA, NAU, Bharuch was the chairman of the session and Dr Sandhya Kranthi, Head Crop Protection, CICR, Nagpur acted as Co-chairman, Dr. B. Dhara Jothi, Principal Investigator (Entomology) was convener, Dr Rishi Kumar, Principal Scientist (Entomology), CICR, Sirsa and Dr. Himanshu Desai, Associate Research Scientist, MCRS, NAU, Surat were the rapporteurs of the session. Dr. Dhara jothi welcomed the delegates and briefed about the pest scenario of cotton during 2015-16 and expressed the concern about the whitefly outbreak in North India and pink bollworm menace in Central and South India. The chairman in his opening remarks appraised the house that cotton is a crop where more than 50% of the total insecticides are being used, though the quantity of spray reduced after introduction of Bt cotton having resistance to bollworms. However, sucking pests especially mealy bugs and whitefly problem has led to increase the usage of insecticides. He also requested that cotton is an important crop and the responsibility of the cotton entomologist has become relevant in the light of emergence of whitefly and break down of PBW resistance in BG II .

Dr Sandhya drew the attention of all to be alert about the emergence of pests and diseases and called for early detection and timely measures for their management. Dr.B. Dharajothi, PI (Entomology) requested all scientists to send the reports in time and in format. She also requested to follow the uniform protocol for recording surveillance of farmer's field.

Dr. Patel advised to check the germination before supplying the seed, to all concerned who has been assigned the duty of seed supply for various experiments. Dr Sandhya suggested to record the data on 50% flowering in the screening trial to study the flowering window which has become imperative under HDPS. Dr Dhara jothi advised that besides Hisar one more centre in South should do the biochemical analysis of promising advance screening material. Dr Sandhya advised to use the data collected under AICRP for development of various prediction models, and Dr Sabesh has been assigned the duty w.r.t. to whitefly prediction model. Dr Patel advised to consider all factors including the natural enemies population in prediction model including the normal rainfall year for the model in the light of climate change

Dr. A.H. Prakash, PC (cotton) advised all the centers to apprise the PC cell about any unusual occurrence of pests in cotton crop at the earliest for immediate remedial measures. Due to delayed information the timely contingency measures could not be put in place. . He advised to take up the trials in the Centres only where the entomologists are available. Dr Patel advised to take help of KVK scientist in survey and surveillance at farmers field to keep the PC cell updated as the PC was not convinced about the feed backs received only on the basis of the station trial data.

Dr. K. R. Kranthi , Director, CICR , emphasized to use screening trial data in development of repository of lines for various pests and diseases. Dr Kranthi also advised to check the efficacy of various pheromone traps, biocontrol agents and also to study scientifically and experimentally the role of nitrogen, date of sowing and other agronomic interventions in sucking pest emergence. Dr P.Srinivasan appraised the house regarding installation of pheromone traps in gineries from this year onwards to study the moth emergence pattern. The session came to an end with the vote of thanks by , Dr.B.Dhara jothi, PI Entomology.

TECHNICAL PROGRAMME FOR 2016-17

Ent. 1 (a): Screening of breeding material for resistance to insect pests (National & Zonal Trials):

(All Centres including new centre)

- Include **check entries without seed treatment** as that of coded entries
- Find out resistant/tolerant entries (reference to varieties)
- Shortlist resistant/tolerant entries-based on only grading as tolerant/susceptible.
- Collect seeds for advanced screening trial

Check entries for the different zones:

North Zone: RS2013 (resistant to jassid & whitefly); ND LH-938 (Leaf hopper tolerant) GA (susceptible) MRC 7017 BGII (bollworm resistant); MRC 7017 NBt (bollworm susceptible)

(Action: Dr. Roop Singh Meena , Sri Ganganagar, to provide seeds of RS2013 and GA to all concerned and Dr Sitha Ram Sharma will supply seed of ND LH-938 to all concern)

Central Zone: DHY286, NDLS-938 (jassid resistant); DCH32 (susceptible) Bunny BGII (bollworm resistant); Bunny non Bt (bollworm susceptible)

(Action: Seeds supply – Sr Cotton breeders of their respective centres, Dr. S.Udikeri Dharwad, Bunny Non Bt –PI,Entomology . Dr Sitha Ram Sharma will supply seed of ND LH-938 to all concern)

South Zone: Bunny (Jassid tolerant), NDLS-938 (Leaf hopper tolerant) ; DCH32 (susceptible) Bunny BGII (bollworm resistant); Bunny Non Bt (bollworm susceptible)

(Action: Dr. S.Udikeri, Dharwad to provide seeds to all concerned, &Bunny Non Bt –PI, Entomology, Dr Sitha Ram Sharma will supply seed of ND LH-938 to all concern)

Besides the zonal trials, entomologists of all centres should observe the National Trials (Breeding/Pathology) for healthy plants from point of sucking pests up to 70 DAS and at harvest and tag them, report them and collect seeds for further screening in the next year.

Ent. 1 (b): Advanced screening of promising entries for development of repository for sucking pests

Promising entries from the 2014-15 breeding trials and selected entries from the repository expt (Ent 1C) during 2014-15 have to be screened in common trial **and evaluate further**. The large scale testing (3 rows) will be carried out in two replications along with the susceptible and resistant checks. The following scientists will be distributing the seeds to the respective centres.

Action : Dr Suneet Pandher for North zone (Whitefly only)

Dr H R Desai for Central zone, Supply seed from Ent 1c (2014-15) to all participating centres of the zone. (Sucking pests)

Dr Durga Prasad Rao for South zone, Supply seed from Ent 1c (2014-15) to all participating centres of the zone. (sucking pests)

North Zone: RS2013 (resistant to jassid & whitefly); GA (susceptible)

Central Zone: DHY286 (jassid resistant); DCH32 (susceptible)

South Zone: Bunny (Jassid tolerant); DCH32 (susceptible)

Dr K.K.dahiya from CCS HAU,Hisar and Dr S.S. Udikeri from UAS , Dhadwad will also do the biochemical analysis of promising cultures

Ent. 2: Population dynamics to develop suitable forecasting model: All centres

Data should be taken for both sucking pests and bollworms from RS 2013, Ganganagar Ageti, HS-6, BG and BG-II respectively for North India and DCH32, BG and BG-II for Central and South India.

S. No	States	Genotypes for sucking pests	Genotypes for Bollworm		Centres
			Non BG	BG-II hybrids	
1	Rajasthan	Ganganagar Ageti, RS2013	HS6	Any popular Bt hybrid	Sri Ganganagar
2	Punjab	Ganganagar Ageti, RS2013	HS6	RCH650BG-II	Faridkot, Bhatinda
3	Haryana	Ganganagar Ageti, RS2013	HS6	RCH-650BG-II	Hisar
4	Gujarat	DCH32	DCH32	RCH-2BG-II	Surat (I), Junagarh, Bharuch
5	MP	DCH32	DCH32	RCH-2 BG-II	Khandwa
6	Maharashtra	DCH32	DCH32	RCH-2BG-II	Nanded, Akola, Rahuri
7	Odisha	DCH32	DCH32		Bhawanipatna
8	Karnataka	DCH32	DCH32	RCH-2BG-II	Dharwad, Raichur, Chamarajnar
9	AP	DCH32	DCH32	RCH-2BG-II	Guntur, Nandyal, Raichur
10	Tamil Nadu	DCH32	DCH32	RCH-2BG-II	Coimbatore, Srivilliputhur

- **Experimental layout:** At least 3000-4000 sq. meter plots (as per availability) be sown for the studies on population dynamics. Divide the plot into 2 half each (both under protected and unprotected condition). In North Zone, division of area will be according to the varieties/hybrids sown. Keep one half untreated (for sucking pests) and apply required sprays of neonicotinoids (imidacloprid/acetamiprid/thiamethoxam/clothianidin) in the other half as per requirement to keep the population of leafhopper under control, along with Gaucho seed treatment so that the observations for the bollworm can be taken. Collect 150 bolls from each variety and hybrid at 120, 140 and 160 DAS and send the bolls to CICR, Sirsa (North), CICR, Nagpur (Central) and CICR Coimbatore (South) for further recovery of bollworms, particularly the PBW.
- Monitor for the presence of dead pink bollworm larvae beginning 90 DAS to 150 DAS record the egg parasitism of PBW and percentage of parasitism and observe for the emergence of endoparasitoids at each centre.
- **Observations to be recorded:** Weekly observations for aphid, jassid, whitefly, thrips (3 leaves/plant), mealy bug, ABW, SBW, PBW and associated natural enemies after one **month of sowing** (Natural enemies to be recorded species wise).
- Any unusual survival and higher levels of infestation must be notified to Dr. K. R. Kranthi and Dr. B.Dhara jothi immediately by mail or phone. The surviving bollworms (*Helicoverpa armigera* and *Pectinophora gossypiella*) larvae both from Bt and conventional cotton will be brought to the laboratory. From North Zone the larvae shall be sent to Dr. Rishi, Sirsa, Central Zone to Dr. Sandhya Kranthi, Nagpur and for South Zone to Dr. B. Dhara Jothi for carrying out resistance monitoring bioassays.
- **Dr. Roop Singh Meena** will supply the seed of Ganganagar Ageti and RS2013 to all the concerned centres. **Dr. K.K. Dahiya**, Professor, Entomology, HAU, HISAR will-arrange for the seed of HS-6. Dr. S.Udikeri, Dharwad will supply the untreated seed of DCH 32

to the concerned centres directly. The mentioned BG-II hybrid can be obtained directly from the market.

- Monitoring of bollworms across the country, through pheromone traps and lures uniformly sourced from a single best source may be carried out during the season and off season and data may be recorded. Care must be taken to change lures at recommended frequency.
- Monitoring of insect fauna in protected and unprotected plots: Apart from the regular 6 plant scouting, yellow sticky traps from standard companies (uniform source across centres) may be installed at recommended rates in the protected and unprotected plots to monitor the insect fauna (pest and natural enemies both diversity and numbers) to understand seasonal dynamics. Care must be taken to replace installation of yellow sticky traps at recommended frequency during the season.
- Use of sleeve cages to study parasitoids of whitefly (Sirsa, Faridkot, Hisar, Nagpur and TNAU Coimbatore)

Action --- All Centres

Ent. 4: Survey for key and emerging pests in cotton in Farmers Field for weekly advisory

All the centers are requested to collect weekly information on the incidence of the pest on farmers fields and inform **through mail to the PI, Entomology** for further publishing the information through weekly advisory. **The centre Co-PI are requested to send the raw data also as per the population dynamics experiment proforma.**

Action : All centers

Ent 5.a.To study the efficacy of insecticides (new formulations) , biopesticides and neem formulations against Sucking pests (Whitefly) - Paid up Trial by Rallis India Limited

Name of the hybrid: **RCH 2Bt (Centre and South), NCS-855BG-II for North**

No of treatments: **11**

Design: **RBD**

Replications – **3**

Locations: **North Zone: Sriganaganagar,Hisar, Faridkot,Sirsa.**

Central Zone: Junagadh, Rahuri,Akola,Khandwa

Observations: Record the incidence of all the sucking pests and their natural enemies (predators and parasites) before and one week after application of insecticides, which will be done at the moderate level of incidence noticed. The natural enemy's population will be recorded individually.

	Insecticide Treatment	Dosage (g a.i./ha)	Formulation (ml or g/ha)
T1	Pyrifluquinazone (RIL – 125/F1 (20% WG))	75	375
T2	Pyrifluquinazone{RIL – 125/F1 (20% WG)}	100	500
T3	Flonicamid 50% WG	75	150
T4	Buprofezin 25% SC	250	1000
T5	Spiromesifen (22.9 SC)	115	500
T6	Diafenthuron 50% WP	300	600
T7	Neemazal T/S 1% EC	3 ml/l	--
T8	<i>Lecanicillium lecanii</i>	10 g/ l	--
T9	<i>Metarhizium anisopliae</i>	10 g/ l	--
T10	Control(unsprayed)	--	--
T11	Control (Water spray)		

Ent 5.b.To study the efficacy of combination insecticides against pests of cotton (Sucking pests and Boll worms) - (Paidup trial by Dow Agro Sciences India Pvt. Ltd)

North Zone:- Sriganganagar, Faridkot, Bathinda, Hisar, and Sirsa,

Central Zone: Surat, Junagadh, Akola, Khandwa, Nanded , Rahuri, and Banswara

South Zone: Dharward, Raichur, Lam Guntur, Nandyal, TNAU Coimbatore, Srivilliputhur, and Chamrajnagar.

Name of the variety: **Suraj (Central and South Zones), NCS 855-BG-II (North Zone)**

No of treatments : **9.**

Design : **RBD.**

Replications : **3.**

Observations: Record the incidence of all the sucking pests and their natural enemies (predators and parasites) before and one week after application of insecticides, which will be done at the moderate level of incidence noticed. The natural enemy population will also has to be recorded individually.

	Insecticide Treatment	Dosage (g a.i./ha)	Formulation (ml or g/ha)
T1	Spinetoram 10% w/w + Sulfoxaflor 30% w/w WG	120	300
T2	Spinetoram 10% w/w + Sulfoxaflor 30% w/w WG	140	350
T3	Spinetoram 10% w/w	30	300
T4	Sulfoxaflor 30%	90	300
T5	Spinetoram 10% w/w	36	350
T6	Sulfoxaflor 30%	108	350
T7	Pyriproxyfen 5% EC + Fenpropathrin 15% EC	37.5 +112.5	750
T8	Pyriproxyfen 5% EC	37.5	750
T9	Fenpropathrin 15% EC	112.5	750
T10	Control(unsprayed)	--	--
T11	Control (Water spray)	--	--
<ul style="list-style-type: none"> • Observations to be recorded- Before and after application of insecticides on sucking pests and natural enemies and other non target effects especially the resurgence of any other pest. • Design: RBD 			

Ent 6a: Evaluation of pheromone traps and lures against Cotton Pink Boll worm (all central and south zone centres) through mass trapping and Whitefly adult Suction Trap (North, Faridkot/Sirsa/Ganganagar/Nagpur /Guntur)

S. No	Treatments	Lure	Lure Change Period in days after
1	PCI –Delta Trap with replacement sticky liner* & #	PCI-Pectino Lure	60
2	PCI- Delta Trap with replacement sticky liner. ** & #	PCI-Pectino Lure SL (Season Long)	120
3	PCI –Funnel Trap #	PCI-Pectino Lure	60
4	PCI –Funnel Trap #	PCI-Pectino Lure SL (Season Long)	120
5	Phero – Sensor TM– SP – Sleeve Trap ##	PBW LURE	45
6	Phero – Sensor TM– BP – Sleeve Trap###	PBW LURE	45
7	*Adult Suction Trap		

- 1.*.Replacement of the sticky liner once (after the surface is covered by the attracted moths).
2. **.Replacement of the sticky liner thrice (each time after the surface is covered by the attracted moths).
4. # -- 18 - 20traps /acre
5. ## -- 6 - 8 traps/acre
6. Use Pheromone Traps from 1 month crop stage to control pest at early stage.

Observations to be recorded :

1. No of moths trapped /night/trap
2. Correlate the moth catches with field infestations in flowers, green bolls & open bolls
: Record larval populations in field
3. Design: RBD (Trap design X Lure type)

- *Sow NCS-855 BG-II, in 1000 sq meter area; divide in two plots of 500 sq m area each. Operate suction trap in one plot and keep the other plot undisturbed. Observations on whitefly adult before and after operation of suction trap in both the plots and Calculate the reduction in whitefly adult population.

Ent 6a: Evaluation of pheromone traps and lures against Cotton Pink Boll worm (all central and south centre) and Whitefly adult Suction Trap (North, Faridkot/Sirsa/Ganganagar/Nagpur /Guntur)

Sl.No	Treatments	Lure	Lure Change Period in days after
1	PCI –Delta Trap with replacement sticky liner. * & #	PCI-Pectino Lure	60
2	PCI- Delta Trap with replacement sticky liner. ** & #	PCI-Pectino Lure SL(Season Long)	120
3	PCI –Funnel Trap #	PCI-Pectino Lure	60
4	PCI –Funnel Trap #	PCI-Pectino Lure SL(Season Long)	120
5	Phero – Sensor TM– SP – Sleeve Trap ##	PBW LURE	45
6	Phero – Sensor TM– BP – Sleeve Trap##	PBW LURE	45
7	*Adult Suction Trap	•	

- 1.*.Replacement of the sticky liner once (after the surface is covered by the attracted moths).
2. **.Replacement of the sticky liner thrice (each time after the surface is covered by the attracted moths).
4. # -- 18 - 20traps /acre
5. ## -- 6 - 8 traps/acre
6. Use Pheromone Traps from 1 month crop stage to control pest at early stage.

Observations to be recorded :

1. No of moths trapped /night/trap
2. Correlate the moth catches with field infestations in flowers, green bolls & open bolls
: Record larval populations in field
3. Design: RBD (Trap design X Lure type)
 - *Sow NCS-855 BG-II, in 1000 sq meter area; divide in two plots of 500 sq m area each. Operate suction trap in one plot and keep the other plot undisturbed. Observations on whitefly adult before and after operation of suction trap in both the plots and Calculate the reduction in whitefly adult population.

Ent 6 b: Evaluation of Mating Disruption Pheromone for the Pink Boll worm-Paid up trial by Bio-Bee India

Central Zone: Rahuri, Junagadh Khandwa and indore

South Zone: Nandyal , Dharwad, Raichur, TNAU Coimbatore.

Experiment Plot Area – **one acre**

Dosage -- **160gms/acre**

Treatments --- **Three**

Replications ---- **Eight**

Design --- **RBD**

S. No	Treatments	Time of Application	Dose
1	Mating Disruption Pheromone	1 st Spray - 15-20 days after germination.	40 gms/ha
		2 nd Spray - Thirty to forty days after the first spray	80 gms /ha
		3 rd Spray - Forty to forty five days after second spray.	40 gms /ha
2	Profenophos 50EC	1 st Spray - 40 days after germination.	2ml/lit
	Thiodicarb75WP	2 nd Spray - 60 days after the first spray	1gm/lit
	Cypermethrin25EC	3 rd Spray - 100 days after second spray.	1ml/lit
3	Control	----	

Ent 7:Evaluation of egg parasitoid *Trichogramma bactrae* through inundative release (Sri ganganagar, Guntur, Surat, Junagarh, Nagpur, TNAU Coimbatore and Srivilliputhur)

SN	Treatments	Nos/acre	Time of release	Frequency
1.	<i>Trichogramma bactrae</i>	50,000-60,000/ha	Flowering (40-45 DAS & 50-55 DAS)	Two releases at Weekly interval
2	<i>Trichogramma bactrae</i>	50,000-60,000/ha	Flowering (40-45DAS) + boll maturation stage (60-75DAS)	One release at flowering at Weekly interval + 3 releases at boll maturation stage at weekly interval
3	<i>Trichogramma bactrae</i>	50,000-60,000/ha	Flowering (40-45DAS) + boll maturation (60-75DAS)	Two releases at flowering weekly interval + Three releases at boll maturation stage at weekly interval
4	<i>Trichogramma bactrae</i>	50,000-60,000/ha	flowering + boll maturation (60-75DAS)	One at flowering + Three releases during boll maturation stage at 10 days interval
5	<i>Trichogramma bactrae</i>	50,000-60,000/ha	boll maturation stage (60-75DAS)	Four releases at weekly interval.
7	Profenophos 50EC		1 st Spray .	2ml/lit 40 days after germination
	Thiodicarb75WP		2 nd Spray	1gm/lit 60 days after germination
	Cypermethrin25EC		3 rd Spray -	1ml/lit 90 days after germination
8	Natural control	--	--	---

Observations:

1. Percentage of bollworm infestation, number of larvae/25 bolls, bad & good opened bolls to be recorded at as per population weekly interval from 95-100 DAS .
2. Observation on the activity of pollinators may also be recorded as number of pollinators visiting /flower/10 mts.

Ent 8: Entomologists of all centers will record observations in the Agron1B (HDPS evaluation trial) and Agron –V(Tech for organic cotton production) of their centre as per the population dynamics observation sheet.

List of Delegates participated in the meet

S. No.	Name and Designation	Contact
1	Dr. Sandhya Kranthi Head Crop Protection	9923051496 sandhya_kranthi@gmail.com
2	Dr. B. Dhara jothi PI Entomology, AICRP	9443379355 bdhara.jothi@gmail.com
3	Dr. K. C. Patel Principal COA, NAU Bharuch	9601283390 princoab@nau.in
4	Dr. Satnam Singh Assistant Entomologist, PAU, RS, Faridkot	9876962774 satnam@pau.edu
5	Dr. K. K. Dahiya Principal Scientist (Cotton), CCS, HAU, Hisar	9416251305 Kk_dahiya@yahoo.co.in
6	Dr. Rishi Kumar Principal Scientist, CICR, RS, Sirsa	9466375285 rishipareek70@yahoo.co.in
7	Dr. Himanshu Desai Associate Research Scientist, MCRS, NAU, Surat	9825808694 hrdesai@nau.in
8	Dr. M. Sabesh Scientist, CICR, RS, CBE	94431115368 sabesh23@gmail.com
9	Dr. J. Gulsar Banu Principal Scientist, CICR, RS, CBE	9443041442 gulsarsci@gmail.com
10	Dr. Suneet Pandher Assistant Entomologist, PAU, RS, Faridkot	9814513681 suneet@pau.edu
11	Rajiv Rathod PDM, Dupont	7043739582 rajiv.rathod@dupont.com
12	Dr. U. B. Hole Cotton Entomologist (Associate Prof.), MPKV, Rahuri M.S.	9960052852 uttamhole@gmail.com
13	Dr. S. S. Udikeri Principal Scientist (Ento), ARS, Dharwad - 580007	9448136821 ssudikeri@gmail.com
14	Dr. K. P. Gundannavar Scientist (Ento), ARS, Dharwad - 580007	9535993257 kpg2006@rediffmail.com gundannavarkp@uasd.in
15	Srinivas Parimi Group Leader (Entomology)	9823076235 srinvasparimi@mahyco.com
16	Basweshwar Ghedki Technical Transfer Manager	8450915434 bsghodki@dow.com
17	Aparna Baruah Technology transfer executive	7710083122 abarnah@dow.com
18	Dr. Shivleela Associate Professor (Ento), MARS, Raichur	9481467339 shivleelaent@gmail.com
19	Dr. Sanjeev kumar kataria Assistant Entomologist, PAU, RS, Faridkot	9988901590 K.sanjeev@pau.edu
20	Dr. Roop Singh Meena Assistant Professor, Entomology, ARS, Sriganganagar	9413024080 rsmeenaars@gmail.com
21	Dr. R. K. Kalyan Assistant Professor, Entomology, Banswara, MPUAT - Udaipur	9414319459 rkkalyan@rediffmail.com
22	Rakesh K. Patel Assistant Research Scientist (Ento), RCRS, NAU, Bharuch, Gujarat	9979892927 rkpatel@nau.in
23	Dr. M. S. Mahalakshmi Scientist (Ento), RARS, Lam, Guntur	9989130480 msmlaxmi@gmail.com
24	Dr. Vishlesh Nagarare Senior Scientist, CICR	9420397178 vs.nagarare@gmail.com
25	Mr. K. Pradeep Kumar AGM Field Development, Bayer Crop Science	9989932394 pradeep.kumar@bayer.com

26	Mr. Nitesh Jasani Crop Manager, Bayer Crop Science	9167591429 nitesh.jasani@bayer.com
27	Mr. GVS. Naidu Head Agronomic Services – APAC, Bayer Crop Science	9963414443
28	Mr. Vijay Khambare Manager Field Development, Bayer Crop Science	7096946944 vijay.khambare@bayer.com
29	Mr. Girish Kalagudi Breeder – Cotton introgression, Bayer Crop Science	9676455594 girish.kalagudi@bayer.com
30	Prof. R. K. Vekaria Assistant Research Scientist, Cotton Research Station, Junagadh	9824592133 rkvekaria@gmail.com
31	Dr. K. Sasikumar Assistant Professor (Entomology), CRS, Srivilliputhur	9786792696 entosasi88@gmail.com
32	Dr. K. Senguttuvan Assistant Professor (Entomology), Department of Cotton, TNAU, Coimbatore	9176690292 senguttuvanphd@gmail.com
33	Dr. S. M. Telang Assistant Entomologist, C.R.S. Nanded (M. S)	9422189877 shivajitelang@rediffmail.com
34	Dr. S. K. Parsai Senior Scientist	9406677601 sk.parsai@gmail.com
35	Mr. Sreekanth Entomologist, Seed works International Pvt. Ltd.,	9949067981 sreekanth@seedworks.com
36	Mr. V. P. Nagre Senior Breeder, Kalash seeds Pvt. Ltd.,	9421645795 nagarevilas@gmail.com
37	Dr. S. U. Pardeshi Senior Breeder, GTL, Nath seeds	9325002412 supardeshi@nathseeds.com
38	Dr. Ashish Kanwal Technology Development Manager, Monsanto, Ahmedabad	9925462837 ahkanwal@gmail.com
39	Dr. A. S. R. Sarma Scientist, RARS, Nandyal, ANGRAU	9966805948 sharmarars@gmail.com
40	Mr. Niranjan Mandi Assistant Entomologist, AICRP on Cotton, OUAT, Bhawanipatna	9932330429 nirumandi.ento@gmail.com
41	Mr. Pankaj Dharkar Research Officer, Ankur seeds Pvt. Ltd., Nagpur	9822265951 pmdharkar@ankurseeds.com
42	Dr. G. R. Bhanderi Assistant Research Scientist, MCRC, Surat	9662530036 grbhanderi@yahoo.co.in
43	Mr. Prabhulinga. T Scientist, CICR, Nagpur	9620056447 Prabhut07@gmail.com
44	Dr. V. Chinna Babu Naik Scientist, CICR, Nagpur	9665694463 chinnaento@gmail.com
45	Mr. Prasahant V. Bhavsar Jr. college teacher, Crop science	8007936899 pvbhavsar@rediffmail.com
46	Dr. B. Ram Prasad Scientist (Ento)	9963073087 rampi_7glyahoo.com
47	Mr. Vishnu Rodge Executive UPL Ltd.,	7722051413 vishnu.rodge@uniphus.com
48	Mr. Shivar Dhulshette Executive UPL Ltd.,	8866005556 dhulshette.shikas@uniphus.com
49	Dr. P. W. Nemade Cotton Entomologist, CRU, Dr. PDKV, Akola	9850208111 pwn.pdkv@gmail.com
50	Dr. R. D. Patel Assistant Research Scientist (Ento), Surat	9879996115 rdpatel@nau.in

Plant Pathology Panel

Date: 08/04/2016

Chairman : Dr. A. N. Sabalpara, Director of Research & Dean P. G. Studies, Navsari
Convener : Dr. D. Monga, Principal Investigator (Pathology), AICRP on Cotton
Rapporteurs: : Dr. B. Sreelakshmi, Principle Scientist (Pl. Path.), ANGRAU, Guntur
Dr. Prashant B. Sandipan, Assistant Research Scientist, MCRS, NAU, Surat (Plant Pathology), Gujarat

Dr. A. N. Sabalpara, Chairman of the session started the proceedings with the introduction of participants. He strongly emphasized the use of eco-friendly and cost effective technologies in plant protection. Dr. D. Monga during his introductory remarks, addressed the achievements made during 2015-16 crop season by the scientists of Plant Pathology from different centers of AICRP and CICR following thematic research programmes. Besides, as per the technical program he stressed the use of susceptible checks in screening trials. He also advised scientists to analyze the long term data of CLCuD, *Alternaria* Leaf Blight, Bacterial Leaf Blight, Grey Mildew and Rust by developing regression equations.

The following scientists from different AICRP Centers attended the meeting and presented the results of 2015-16 trials. The technical programme for the year 2016- 17 was finalized after thorough discussion.

1. Dr. Jagdish Beniwal, Principal Scientist (Pathology), CCSHAU, Hisar
2. Dr. B. Sreelakshmi, Principal Scientist (Plant Pathology), Guntur, ANGRAU
3. Dr. Sudharsan Latake, Asst. Pl. Pathologist, MPKV, Rahuri
4. Dr. Venkatesh R. Kulkarni, Scientist Plant Pathology, ARS, Dharwad Farm (UAS, Dharwad)
5. Dr. Aman Sharma, Assistant Plant Pathologist, Punjab Agricultural University, Regional Station, Faridkot
6. Dr. Pradeep Kumar, Asst. Professor (Pl. Pathology), Agril. Research Station, Sriganganagar
7. Dr. Rupesh Kumar Arora, Asst. Plant Pathologist, PAU, Regional Station, Bathinda, Punjab
8. Dr. P. Latha, Asst. Professor (Plant Pathology) Department of Cotton, TNAU, Coimbatore
9. Dr. Prashant B. Sandipan, Asst. Res. Sci., MCRS, NAU, Surat, Gujarat
10. Dr. V. V. Rajani, Res. Sci., CRS, Junagadh
11. Dr. V. V. Deshmukh, Cotton Pathologist, Dr. PDKV, Akola, MH
12. Dr. M. S. Chauhan, Sr. Plant Pathologist (Retd.) CCSHAU, Hissar
13. Dr. Raveendra R. Soddi, Plant Breeder, Bayer Crop Science Pvt. Ltd.
14. Basavaraj, Huggi, Sr. Cotton Breeder, Krishidhan Seeds, Jalana, MH
15. Dr. Mahender Singh, Sr. Scientist, Metahelix Life Sciences Ltd., Bengalore
16. Dahyabhai Bhand, Business Manager Cotton, Xylem Seeds Pvt. Ltd., Hyderabad
17. Vinod K. Patel, Principal Scientist, Global Transgenics Ltd., Aurangabad
18. Dr. Bimal Gopinath, Market Development Manager, Seed Works, International Pvt. Ltd., Hyderabad.
19. Shyam Pardeshi, Sr. Breeder, GTL, Aurangabad
20. Nagre Vilas P., Sr. Breeder, KSPL, Jalna, MH

Technical Programme: 2016-17.

Path.1: Epidemiological studies on cotton diseases (continued)

1(a): Observations on the occurrence of the diseases (in farmer's field and research farms) - (All centers* except Pune and CICR Sirsa). (Long term)

All Information regarding major / minor / new (e.g. Tobacco streak virus disease, *Helminthosporium* Leaf spot and *Cercospora* leaf spot etc) diseases have to be reported. The participating centers should record the data in per cent disease index in 10 locations in farmers' fields and research farm during early, mid and late season as per the earlier finalized AICRP standardized protocols. The disease occurrence in organic cotton and high density planting trials conducted at different centers should also be recorded and reported by the concerned Pathologists. In representative areas the names of varieties or hybrids raised under farmers holdings need also be recorded. All centres will purchase GPS under AICRP budget, for use in the survey. Information on various nematode diseases causing losses in cotton may also be recorded in association with experts of AICRP on nematodes or other university scientists during surveys.

(PAU, Faridkot; PAU, Bhatinda; CCSHAU, Hisar; ARS(SKRAU), Sriganaganagar; ARS (MPU AT), Banswara; NAU, Surat; CRS (JAU), Junagarh; Dr PDKV, Akola; CRS, Nanded; MPKV, Rahuri; MPKV, Pune; BM College of Agriculture (RVSKVV), Khandwa; TNAU, Coimbatore; ANGRAU,Guntur; RARS, Nandyal; UAS, Dharwad.

Note: Name of the district surveyed and the approximate cotton area in that district may be added in the table.

The centers carrying surveys on the occurrence should mention the jurisdiction of university along with names of the districts covered.

1(b): Disease progress in relation to weather factors (All centers* except Pune) (Long term)

The experiment will continue as per the earlier procedure suggested. Each center will focus on most important disease on a susceptible variety/hybrid or Bt hybrid for correlation. Further it was decided that:

The regression equations developed by few centers based on long term data for example-

1. CLCuD by Sirsa, Hisar and Faridkot centre

2. Alternaria blight at Rahuri center will be validated in the respective zones by other centers during 2016-17 where the diseases are prevalent, with their existing data. Following centers were requested to develop prediction model based on the collection and collation of the existing and current data

1. North Zone - Pool the existing data on CLCUV and develop prediction models for the region. (Action: Dr. Jagdish Beniwal, CCSHAU, Hisar with the help of Statistician of the University.)

2. Central Zone - Nanded centre will collect grey mildew data from central zone, pool it and develop prediction models for Grey Mildew. (Action: Dr. Pavan Dhoke).

Akola centre will collect bacterial blight data from central zone, pool it and develop prediction models for the disease. (Action: Dr. V. V. Deshmukh).

3. South Zone - Guntur centre will collect leaf rust data from south zone and develop prediction model (Action: Dr. B. Sree Lakshmi).

The exercise will be completed and disease wise regression models will be developed within the next season.

Chairman suggested considering the number of observations on disease progress during critical period with a single window and bring out the step-up/ down regression equations with the minimum number of influential weather parameters.

1(c): Studies on the variability of *Alternaria* leaf spot (All centers*) (DOS 2010-11)

All the scientists from different centres should send the cultures of *Alternaria* isolated from the leaf blight samples with confirmed pathogenicity and taxonomy for diversity analysis of *Alternaria* at species level to Cotton Pathologist, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore – 641 003.

The isolates need be deposited with authenticated validation at NBAIM, Mau Nath Bhanjan, Uttar Pradesh; Agharkar Research Institute, Pune and Institute of Microbial Technology, Chandigarh. All isolates are to be sent to PI (Dr. Dilip Monga) who will coordinate the registration process.

1(d) Survey and Epidemiology of TSV (Centers-Lam, Guntur, TNAU, Coimbatore, TNAU, and Dr PDKV, Akola; CRS, Nanded; MPKV, Rahuri). (DOS 2009-10)

Survey for occurrence of TSV from major cotton growing tracts of different districts in the states mentioned above will be carried out. Area wide TSV incidence may be recorded to have idea on threat perception.

Development of disease rating scale (0-4) for TSV has to be validated. 0-Free from the disease, 1- few upper leaves showing chlorosis or necrosis; 2- Moderate square drying and few branches affected; 3- Severe burning of squares and more branches affected; 4- Severe stunting inclusive of above symptoms. Besides, yield loss assessment may continue at different centers.

Three centers (Guntur, Coimbatore and Rahuri) will try the influence of micronutrients and bio-control agents for the management of TSV.

Path. 2: Screening of AICRP entries for disease reaction (continued)

Path. 2: (a) Screening of breeding lines for disease reaction (all centers)

North Zone Centers: Both National and Zonal entries*

*Only National entries at CICR, RS, Sirsa

Central and South Zones: National and Zonal entries

Susceptible check for each important disease (Common or individual) should be maintained in each screening trial at all the centers.

Path.2 (b) Confirmation and maintenance of disease resistant lines (all centers) (DOS 2009-10)

At all centre's, scientists will keep the resistant entries (few bolls of selfed seed) from the initial evaluation trials (National trials) like Br. 02a or b for *G. hirsutum* varieties, Br. 22 a/b for *G. arboreum*, Br. 34b for *G. herbaceum* and Br. 14a for *G. barbadense* after screening against important diseases.

A maximum of 2-3 important diseases prevailing in the area will be considered. A maximum of five entries will be kept from each trial.

Seed cotton yield and quality aspects will also be recorded keeping resistance as first priority. Those lines will be evaluated again next year by the concerned pathologist at his centre under field conditions and also tested at hot spot for that particular disease under nursery/ artificial inoculation condition at below mentioned centers to have confirmed final reaction.

Artificial Screening Centers:

1. Cotton leaf curl virus, CICR, Regional Station, Sirsa
2. Bacterial leaf blight PDKV, Akola
3. Alternaria leaf spot MPKV, Rahuri
4. Myrothecium leaf spot, Khandwa
5. Grey mildew, Dharwad
6. Root rot, CICR, RS, Sirsa
7. Fusarium wilt, Pune

Such entries with two years field screening and one year artificial screening data will be kept by plant pathologists for use in developing resistant varieties/ hybrid by that centre.

Note: The field screening will be considered valid only in those years when at least 3 or 4 grade reaction is observed in susceptible checks in screening trials.

One set of confirmed resistant entries (25-50 g seed) may be sent to Head, Division of Crop Protection, CICR, Nagpur under intimation to PI Plant Pathology, which will serve as a repository.

Path. 2 (c) Monitoring of breakdown of resistance against CLCuD in cotton.

(Centres- Hisar, Srigananagar and Bhatinda) (DOS 2013-14)

Entries: 8; Replications: 3; Design: RBD

Plot Size: 5.4m x 3.75m

Spacing: 67.5 x 30 cm (114 Plants) – For Varieties 67.5 x 60cm (60 Plants) – For Hybrids

Observation: Incidence and severity of CLCuD

Varieties:

HS6, F846, RST-9 (Susceptible)

H1098(i), F 2228, CSH-3129 (Moderately Resistant),

Hybrids:

Bio 6317(Susceptible)

Bio 2113 (Moderately Resistant)

Seed of varieties to be supplied by respective centers @ 500 g for each variety.

Dr Jagdish Beniwal will supply the seed of Bt hybrids also to different centers

Path.3: Management of Diseases

Path 3(a.1): Validation of seed dressing chemicals against seed and soil borne diseases of cotton (Concluded)

(Centers: Junagadh, Dharwad, Guntur and Coimbatore) (DOS 2012-13)

Path 3 a3. Evaluation of TrichoCASH (*Trichoderma harzianum*) CICR-G 1% WP for cotton root diseases (Centres: Pune, CICR Nagpur and its Regional Station Sirsa). (DOS 2013- 14) (Concluded)

Data will be pooled and results will be submitted during the next workshop.

Path. 3 (c): Developing IDM modules for the management of cotton diseases (DOS 2011-12 to 2013-14; completed at Guntur, Rahuri and Coimbatore)

(DOS-2014-15: Centers - Dharwad, Akola and Junagarh)

(DOS-2016-17: Centers - Nanded, Surat and Khandwa)

Treatment details:

T-1: Module 1

T-2: Module 2

T-3: Module 3

T-4: Module 4

T-5: Module 5

T-6: Module 6

T-7: Control

Susceptible Bt cotton hybrid will be selected

Design: RBD

Replications: 3

Plot size: Approximately 50 sq.m

T-1: Module 1	T-2: Module 2	T-3: Module 3
ST – <i>Trichoderma viride</i> (TV-TNAU) @ 10g/Kg of seed; SA @ 2.5 Kg developed in 250 kg FYM or vermicompost/ ha; Foliar spray with <i>T. viride</i> @ 1%.	ST – <i>Bacillus subtilis</i> (BSC5-TNAU) @ 10g/Kg of seed; SA @ 2.5 Kg developed in 250 kg FYM or vermicompost/ ha; Foliar spray with <i>B. subtilis</i> @ 1%	ST – <i>Pseudomonas fluorescens</i> (PF-TNAU) ; SA @ 2.5 Kg developed in 250 kg FYM or vermicompost/ ha ; Foliar spray with <i>P. fluorescens</i> @ 1%
T-4: Module 4	T-5: Module 5	T-6: Module 6
Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application - <i>Pseudomonas fluorescens</i> - PF CICR @ 2.5 Kg/ha in 250 Kg of Compost or FYM; Foliar Spray with <i>Pseudomonas fluorescens</i> 1 % – PF CICR.	Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application of <i>Trichoderma viride</i> @ 2.5 Kg/ ha TV-TNAU1 FS with propiconazole 0.1% for fungal diseases and COC (0.3%) + Streptomycin (0.01%) for BLB or Carbendazim 0.1% for grey mildew on need basis	Seed Treatment – PF CICR @ 10g/Kg of seed; Soil Application of <i>Trichoderma viride</i> @ 2.5 Kg/ha TV-TNAU1 in 250 Kg of Compost or FYM; Foliar spray with Kresoxim methyl @ 1ml/ litre followed by Captan + Hexaconazole @ 1.5 g/ litre for fungal diseases or COC (0.3 %) + Streptomycin (0.01 %) for BLB
T-7: Control		

**Need based application of sprays (number as well as time) may be given based on the disease severity observed in the respective places. Formulations of *Trichoderma viride*, *Pseudomonas fluorescens* and *Bacillus subtilis* will be supplied by TNAU, Coimbatore Centre and another preparation of *Pseudomonas fluorescens* by CICR, Nagpur, respectively.

The interventions within a module can be modified based on location needs.

Additional treatments with native isolates and only chemicals will be taken up at Junagadh. Other centers may also add native bioagent treatments based on availability.

Observation:

Germination %, plant height, days taken for first flowering, soil borne and foliar diseases and yield parameters.

Chairman advised to take up seed treatment with bio control agents @ 10 g/ kg seeds and soil application @ 2.5 -4.0 kg / ha in a long duration crop like cotton. He also advised for the inclusion of the fungicides registered with the CIB.

Path. 3 (e). Innovative interventions for the management of CLCuD (DOS-2015-16)

Locations: Faridkot, Sirsa (CICR), Sriganaganagar, Hisar & Bhatinda

Treatment details: T1 - Butter milk @ 5%, T2 - Cow urine @ 6.6%, T3- Neem oil @ 1%, T4 - Mustard oil @ 3%, T5 - Calcium nitrate @ 0.5%, T6 - Cow urine+Calcium nitrate , T7 - Cow urine+Butter milk, T8 - Butter milk+Calcium nitrate, T9 - Lachesis 30, T10 - Digitalis 30, T11 - *Apis mellifera* 30, T12 - Bryonia 30, T13 - Natrum Mure 30, T14 - Polo @ 0.1% and T15 - Jasmonic acid @ 150 µmol at 30 days after sowing (single spray) and T16 - Control

Spacing - 1.0 x 0.6 m

Plot size - 5 x 5.4 m (60 plants)

Replications - 2

Design - RBD

Spray: Sprays to be initiated 30 days after sowing and to be followed at fortnightly interval. A total of five sprays will be given for white fly.

Observations: Pre spray, 7 DAS and 15 DAS observations on CLCuD incidence and for whitefly (before spray, three and seven days after spray) will be recorded. To work out PDI, after fortnight of 5th spray, observations will recorded according to new grade scale (0 to 6). Data will be analyzed statistically and tabulated.

Path.4 (e) Crop loss estimation due to CLCuD and distribution pattern of CLCuD in North Zone (DOS2011-12)

Experiment 1: To work out relationship between Disease index and yield reduction due to cotton leaf curl virus disease

Location: Hisar, Faridkot and Ganganagar

Variety /hybrid: Local Popular Bt hybrids

Treatment details and observations:

On research farm 4 local popular hybrids will be sown in half an acre area and 10 sets each (50 plants/set) of diseased and healthy plants will be tagged and data on Disease Index, yield loss and quality parameters will be recorded and analyzed.

Same hybrids may be selected at all locations to develop multi location data

Experiment 2: Study on distribution pattern of cotton leaf curl virus disease on local popular Bt hybrid at farmer's field. (DOS 2009-10)

Location: Hisar (Sirsa - Sub Centre), Faridkot, Ganganagar and Bhatinda

Observations of CLCuD occurrence (PDI) in two villages in each block (district wise) will be recorded during the cropping season for popular hybrids. The locations will be evenly spread over the entire state. At each location, 4 set of observations (25 plants each, totaling 100 plants) will be recorded in a field.

The data recording should be uniform at all the centers.

Experiment 3: In order to study CLCD progress and yield estimations, an experiment with two resistant and two susceptible Bt hybrids will be sown at Sirsa in half an acre area to study CLCuD progress from 40 days after sowing at biweekly intervals and correlated with yield reductions.

While making disease maps the following disease scale may be followed: Very severe > 50 %, Severe- 30.1-50 % (combining MS & S of Disease scale), Moderate- 20.1-30 %, Low- 10.1-20 %, Traces-0.1-10 % in place of that presently being followed.

Path 7: Fusarium wilt of cotton (Pune Centre) (Continued)

The Pune Center will screen all Desi cotton genotypes (*G. arboreum* and *G. herbaceum*) in combined *Fusarium* cultures at sick plot. The seeds (25 gm of each entry) of all desi cotton trials may be sent to Pune centre from CICR Regional station, Coimbatore while distributing seeds, for screening Fusarium wilt (Action: Project Coordinator & PI Plant Breeding).

The centre will also conduct the following studies

1. The seed borne nature of Indian isolates
2. The effect of available isolates on *G. hirsutum* and *G. barbadense*
3. Confirmation of available races in India by using race specific primers

Chairman advised to initiate screening of cotton wilt by reviving the sick plot at Hansot, NAU, Navsari.

Principal Investigator (Plant Pathology) thanked Dr. A. N. Sabalpara, Director of Research & Dean P. G. Studies, NAU, Navsari for chairing the session and for constructive and critical suggestions to improve the technical programme through active interactions.

Session 5: Proceedings on Transfer of Technology session

Date: 09/04/2016

Chairman: Dr. Anil Pratap Singh, Addl. Commissioner (Crops), DAC, GOI, New Delhi

Co-chairman: Dr. P. L. Nehra, Director of Extension Education, SKRAU, Bikaner

Convenor: Dr. A.H. Prakash, Project Coordinator (Cotton Improvement)

Co-Convenor: Dr. S. Usha Rani, Senior Scientist, ICAR-CICR, Regional Station, Coimbatore

Rapporteur: Dr. A. Manivannan, Scientist, ICAR-CICR, Regional Station, Coimbatore

The Transfer of Technology session was formally initiated by welcome address by Dr A.H. Prakash, Project Coordinator (Cotton). In his address he presented the physical and financial report of NFSM-FLD conducted by AICRP on Cotton during the year 2015-16. This was followed by the Centre-wise compiled report by Dr (Mrs) Usha Rani.

In the interactive session, the Chairman of the session, Dr. A.P. Singh, Additional Commissioner (Crops), DAC, GOI, New Delhi addressed the delegates. In his address, he emphasized the need for increasing more number of demonstrations under the component of Desi cotton in North India. He also suggested the Scientists at ICAR-CICR to validate the hand held cotton picker developed by SIMA –CDRA, Coimbatore and then to demonstrate under FLD on pilot basis to evaluate the performance of hand picker at farmers' fields. He further assured to release the FLD budget in time for successful conduct of FLDs during the year 2016-17 and to arrange for a buy back system in collaboration with Cotton Corporation of India. He also assured that efforts will be made to increase the fund allotment for conducting each FLD during next plan period. The co-chairman, Dr. Nehra, Director of Extension Education, SKRAU, Bikaner suggested increasing the number of demonstrations under seed production of Desi varieties for producing enough quantity of seeds of Desi cotton varieties. Then the centres proposed the physical and financial targets of FLD for the year 2016-17.

During the concluding remark, the Project Coordinator thanked DAC for the timely release of Rs 30.00 lakhs during 2015-16 which helped in timely supply of inputs and successful completion of the demonstrations.

The session ended with vote of thanks by Dr. Dr. S. Usha Rani, Senior Scientist, ICAR-CICR, Regional Station, Coimbatore.

Session 6: Interactive meet on “Strategies to combat Pink Boll Worm menace in Bt Cotton in Central and South India”

Date: 09/04/2016

Dr Jeet Singh Sandhu : Deputy Director General (Crop Science), ICAR, New Delhi
Dr C.J. Dangria : Hon'ble Vice Chancellor, NAU, Navasari
Dr K.R. Kranthi : Director, CICR, Nagpur
Dr.C.Chattopadhyay : Director, NCIPM, New Delhi
Dr.Sandhya Kranthi : Head, Division of Crop Protection, CICR, Nagpur
Dr B. Dharajothi : Principal Investigator, AICRP on Cotton

Dr (Mrs) B. Dharajothi, PI (Entomology) ICARP on Cotton in her welcome address during the interactive meet on “Strategies to combat Pink Boll Worm menace in Bt Cotton in Central and South India” informed the house that the preceding year was difficult for cotton cultivation. In the North it was initial drought followed by whitefly and CLCuD menace. The Central and south the crop was exposed to severe drought during the peak boll development and Bt hybrids were attacked by pink bollworm. The Chairman of the Session Hon'ble Deputy Director General (Crop Science), ICAR expressed it was a very bad year with not only cotton but

also soybean, wheat and cluster beans were affected. Dr. C.J. Dangaria, Vice Chancellor, NAU, Navsari, Dr.K.R Kranthi, Director, ICAR-CICR, Nagpur, Dr.C.Chattopadhyay, Director, ICAR-NCIPM, New Delhi, Dr.Sandhya Kranthi, Head, Division of Crop Protection, ICAR-CICR, Nagpur, Dr.B.Dharajothi, Principal Investigator (Entomology) AICRP on Cotton presented their views about Pink Bollworm menace in Bt Cotton in Central and South India. Directors of Agriculture from various states in Central and South India and Directors of Research from Agricultural Universities briefed the measures taken to combat the Pink boll Worm menace (PBW) in Bt Cotton. Dr.B.Dharajothi, Principal Investigator (Entomology) AICRP on Cotton welcomed the gathering.

In the presidential address Dr.Jeet Singh Sandhu, Honorable DDG (Crop Science), ICAR briefed the Pink Bollworm menace in Central and South India and he emphasized the stake holders to prepare advisories separately for Pink Bollworm and White fly. The measures taken by the council for the management of Pink Bollworm was highlighted by the DDG.

Dr.C.J.Dangaria, Vice Chancellor, NAU, Navsari viewed early sowing during August-September and late sowing during November to December were the major reason for PBW outbreak in Bt Cotton.

Dr K.R.Kranthi rated the PBW problem as more severe than whitefly, as the PBW has developed resistance to crytoxins. According to him, whitefly can be managed easily. The problem may have surfaced due to cultivation of long duration hybrids, non availability of cry genes in homozygous conditions, usages of insecticides early in the season. Application of insecticide in early season killed even the natural enemies of lepidopteran pests. He emphasized that cultivation of short duration varieties/hybrids which are tolerant to jassid, so that the farmers need not take up insecticide spraying during early season. The Director also recommended the termination of crop after harvest, IPM practices, pheromone trap for pest monitoring, mating disruption chemicals and use of light traps are the current management practices to combat this menace of PBW in Bt Cotton.

Dr Chatopadhyay, Director, NCIPM, appraised the house that during 2015-16, presence of *Helicoverpa armigera* in Kinnow and wheat. He insisted on the close monitoring of pest is the need of the hour.

Dr.Sandhya Kranthi, Head, Division of Crop Protection, ICAR-CICR, Nagpur briefed the house about the steps taken by ICAR-CICR for the management of PBW. She insisted on encouraging the farmers to use quality pheromone and biocontrol agents like *Trichogramma bactriae* and *Bracon* sp.

Dr.Chenga Reddy, Principal Scientist (Cotton), Lam, Guntur presented the status of PBW. According to him the extent of damage ranged from 14-40% and it was maximum of 54% in Guntur. Strategies developed includes the avoidance of summer crop and termination of crop after harvest. He opined that all seed packets should contain the management practices. He stressed the need for creation of awareness among farmers through bulletins, pamphlets, posters and give wide publicity to dispose the stubbles through Departments and KVKs and also to incorporate the stubbles in Soil. The DDG instructed all the stakeholders to create awareness from Seed to Seed.

Dr.B.S.Janagouder, Director of Research, UAS, Dharwad presented the status of PBW in farmers fields of Karnataka during 2015-16.According to him, among 6 district surveyed , Belgaum recorded the maximum of 52-60 % green boll damage .The development of resistance to Cry protein was noticed in PBW in UAS, Dharwad. Control measures like creation of awareness, use of pheromone traps, removal of cotton stalks and composting, deep ploughing and destruction of affected seeds in ginning mills were developed and disseminated to farmers. Director of Research, UAS, Dharwad also briefed the house about the availability of consortia to compost cotton stalks and distribution of consortia to all stake holders was emphasized by The DDG.

Mr.M.G. Mohamad Iqbal , Deputy Director (GOI Schemes), State Department of Agriculture, Government of Tamil Nadu presented overall view about the cotton scenario wherein he mentioned there was no PBW problem noticed in Tamil Nadu.

Dr P R Zanwar, Associate Professor ,Department of Agricultural Entomology, Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani presented the overall damage due to PBW from 1996-1977 to 2015-16. A maximum damage of 23.70/100 green boll was noticed during 2015-16. He reasoned out that the increase in area under extended crop/rationing, availability of crop throughout the year, storage of cotton in ginning mill and market, presence of crop residue in field for longer duration, different duration of Bt cotton hybrids, development of resistance and influence of weather could have caused the outbreak of PBW in cotton. Control measures recommended by Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani includes the monitoring of pest, use of parasitoid *Trichogramma bactriae*, timely termination of crop , crop rotation, mass trapping and mating disruption using pheromone traps, use of insecticides ,timely completion of picking, monitoring at storage Ginning yards and distribution of Bulletin / Poster to village panchayats and training of master trainers.

Directorate of Agriculture, Gujarat State, Gandhinagar reported the high incidence of PBW in Coastal districts like Amreli, Bhav Nagar and Junagadh. He presented the road map for 2016-17 to combat PBW in Cotton. On a reply to the question raised by the DDG, he said that the weather condition prevailing in coastal region could have favoured the more infestation of PBW. Awareness campaign regarding the PBW management was conducted for farmers, ginners and seed distributors and dealers. The DDG stressed the need to educate the ginners in all the states regarding PBW management. The chairman also emphasized the need for the availability of quality pheromone traps to farmers through department and in market. Vice Chancellor, NAU, Navsari said that due to heavy demand during last year, the quality of lure available in market was very low. The DDG, in concluding remarks stressed the importance of weekly surveys, interaction among scientist working on the management of PBW, timely dissemination of technologies, availability of quality pheromone traps, composting of crop residues and use of biocontrol agents.

The Vote of thanks was proposed by Dr A.H. Prakash, project Coordinator (Cotton). He thanked the chair and all dignitaries, Director of Research from SAUs, representative from the State Agriculture departments of Andhra Pradesh, Telangana, Karnataka, Tamil Nadu, Maharashtra, Madhya Pradesh, Orissa and Gujarat. He expressed his gratitude to all the AICRP scientists and representatives from Private sector industries for actively participating in the meet.

Session 7: Special session on cotton breeding

Date: 09/04/2016

Dr Jeet Singh Sandhu : Deputy Director General (Crop Science), ICAR, New Delhi
Dr C.J. Dangria : Hon'ble Vice Chancellor, NAU, Navasari
Dr R.K. Singh : Assistant Director General (Commercial Crops), ICAR, New Delhi
Dr S.S. Siwach : Director of Research, CCSHAU, Hisar
Dr R.K. Gumber : Assistant Director of Research, PAU, Ludhiana

The special interactive session with Breeders was held on 9th afternoon . Dr S. Manickam, Principal Investigator (plant Breeding) welcomed the dignitaries and the delegates. In his welcome address he presented the research highlights and also the focused research activities planned for 2016-17.

The Chairman in his address stressed that with the climate change being reality there should be breeding for both biotic and abiotic stress. During the process focus on by-products like seed oil and stalks.

The following action points were raised out for discussion among cotton breeders of various states

1. Rainfed trials strictly under rainfed only, no life saving irrigation provided to raise the crop
2. Breeding on host plant resistance(HPR) has to be initiated to mitigate sudden outbreak of pest and disease resistance
3. Dr Sewach expressed that Germplasm day should be conducted periodically at all State Agricultural Universities and ICAR-CICR, Nagpur to make a platform for breeders across the country to select the materials for their breeding programme
4. Advanced Breeding material developed at all centres namely Dharwad, Sirsa, Nanded, Rahuri, Srivilliputtur, Ludhiana, Surat and Coimbatore has to be brought under distribution mode to all breeders across the country to hasten the breeding programme
5. The Hon'ble DDG (CS) expressed that breeding for higher oil content may be initiated. He informed that all the biochemists under AICRP on cotton at (Hisar, Surat and Dharwad) should undertake the evaluation of seed oil in all the breeding entries of the zone. The Project Coordinator (Cotton) informed that one variety CNHO12 has been exclusively released with higher oil content (21% oil). Dr Gopalakrishnan also informed the Chair that the Gossypol content in the cotton seed is a deterrent in effective utilization of oil and breeding for gossypol free seed will surely reduce the oil import.
6. Prebreeding programme has to be initiated at different AICRP on cotton, those material should be brought under AICRP mode for evaluation
7. Special breeding programme on new plant type concept has to be initiated especially suitable for mechanical harvesting. The Project Coordinator (Cotton) informed the house that from 2013 onwards an exclusive trial for evaluation of Compact ideotype has been initiated and one promising entry has been proposed for considering for CVRC.
8. Haploid breeding programme has to be initiated to produce desirable lines
9. The DDG (CS) desired that Sucking pest tolerant *G. hirsutum* germplasm at CICR, Nagpur may be shared with PAU and CCSHAU for developing tolerant lines. Dr Tuteja, Principal Scientist (Breeding), CICR, Sirsa informed the house that 7000 *G. hirsutum* germplasm was evaluated during 2014-16 and around 50 lines were found to be tolerant to whitefly and it has been catalogued. The DDG (CS) instructed the Project Coordinator (Cotton) to coordinate between CICR and SAUs for exchange of materials and fixed the cut off date as 25th April 2016 for completing the process. The Project Coordinator informed that the Director, ICAR-CICR is the custodian of the germplasm line and he will request the Director to spare the material as per ICAR rules.
10. Few Representatives from the private sector raised the issue of evaluation of Bt hybrids under AICRP during 2016-17. The Project Coordinator clarified that this trial was undertaken as per the request of DAC, GOI to screen for CLCuD for North zone. Two years the trial was conducted and the screening protocol was standardized in collaboration with SAUs and Private Sector representative. From the coming year (2016-17) the respective Universities have taken initiative to screen for the same. Dr R.K. Gumber, ADR, PAU, Ludhiana informed the representatives that already all the companies have been intimated and the last date for receiving the seeds was 15th April, 2016 for combined Bt evaluation trials.

The meeting concluded with Vote-of –thanks from Dr A.H. Prakash, Project Coordinator (cotton) and assured the chair that all efforts for pre-breeding and work on abiotic and biotic stress tolerance will be given impetus.

The Project Coordinator in is Vote of Thanks also announced that CICR (RS), Coimbatore, the Head Quarters of AICRP on Cotton –celebrating its Golden Jubilee Year will also host the Annual Group Meeting-2017 at Coimbatore.