

# Cotton Innovate

A Monthly Newsletter from ICAR-Central Institute for Cotton Research, Nagpur



Adults of *Earias vitella* on cotton (Photo: Dr HB Santosh and Dr Vivek Shah)

## Invited Research Note

Cotton bacterial blight pathogen *Xanthomonas*...

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#### Cotton bacterial blight pathogen *Xanthomonas citri* pv. *malvacearum*: Overview on its virulence, races and genetic diversity

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*Xanthomonas citri* pv. *malvacearum* (*Xcm*) is an economically important bacterial pathogen causing blight disease in cotton. Pathogen evolution is a continuous process and it creates variability among the pathogen population. Study of pathogen variability with respect to its virulence, race and genetic level will help to know the status of the pathogen and direct the breeding efforts for resistance and better disease management practices. The survey on the incidence of bacterial blight disease of cotton was carried out in six states namely, Maharashtra, Punjab, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana. Disease samples were also received from different centres of AICRP on Cotton network project. Varied levels of bacterial blight incidence were recorded ranging between 3.00 to 42.00 per cent across the surveyed locations. Different types of symptoms such as angular leaf spot, vein blight, petiole blight, black arm and boll rot (Fig. 1) were observed on diseased plants. The highest disease incidence was recorded in Maharashtra (12.00 to 42.00 per cent) with an average of 21.00 per cent (Nagpur, Akola and Rahuri). The maximum (42.00 per cent) was recorded in Nagpur district. Boll rot symptoms were observed only in Nagpur region. Disease incidence of 13.00 to 22.00 per cent was recorded in Faridkot and Bathinda regions of Punjab, respectively. Bacterial blight incidence ranged between 3.00 and 23.00 per cent in south zone (Telangana, Andhra Pradesh, Karnataka and Tamil Nadu) with maximum of 23.00 per cent recorded in Dharwad region. The pathogen was isolated on Nutrient Agar (NA) medium from collected leaf samples. *Xcm* colonies appeared as yellow to pale yellow, round, convex and mucoid with glistening texture (Fig. 2) and varied from pin head to medium in their size. A total of 34 *Xcm* isolates were isolated from Maharashtra (10 isolates), Tamil Nadu (8 isolates), Punjab (5 isolates), Karnataka (5 isolates), Andhra Pradesh (3 isolates), and Telangana (3 isolates).

#### Pathogenicity and virulence of *X. citri* pv. *malvacearum*

The pathogenicity and virulence were studied on susceptible cultivar (LRA5166). Isolates were inoculated onto 20-day-old cotton seedlings with a concentration of  $2 \times 10^6$  CFU/ml by spray inoculation method. Inoculated seedlings were incubated in a plant growth chamber for symptom development under controlled conditions. Plants were examined for the appearance of lesions from 3 to 20 day post-inoculation. Per cent disease index (PDI) was calculated using a 0-4 disease rating scale. The isolates were classified as less virulent (LV: 0.00–20.00 PDI), moderately virulent (MV: 20.01–40.0 PDI) and highly virulent (HV: > 40.01 PDI) based on PDI. All the isolates (34 numbers) were pathogenic on the susceptible cultivar (Fig. 2). Disease severity (PDI) varied from 7.67 to 66.25 PDI. Among the thirty four isolates, seven were classified as highly virulent (>40.01 PDI), sixteen were moderately virulent (20.01 to 40.00 PDI) and eleven were less virulent (0.00 to 20.00 PDI). The isolate MNSu from Nagpur region of Maharashtra recorded the highest PDI (66.25). PCR amplification of *Xanthomonas* specific housekeeping genes namely *atpD*, *dnaK*, *efp*, *fyuA*, *glnA* and *gyrB* confirmed the isolates at genus level. Sequencing and BLAST analysis of the housekeeping genes confirmed the pathogen as *X. citri* pv. *malvacearum* at pathovar level.

#### Race identification of *X. citri* pv. *malvacearum*

Races of *Xcm* isolates were identified based on reactions of isolates on 10 cotton host differential lines through artificial inoculation. Nineteen different *Xcm* races have been described in different parts of the world. Race 18 is the most virulent and occurs predominantly throughout the world. Eight different races such as 3, 5, 6, 7, 8, 11, 13 and 18 were recorded among 34 *Xcm* isolates used in this study. Among them, twenty two isolates (62%) were race 18 and twelve (38%) isolates were belonged to other seven races.

#### Genetic diversity of *X. citri* pv. *malvacearum*

##### REP, ERIC and BOX-PCR (repetitive elements) and ISSR analyses

Genomic fingerprinting of repetitive elements has been successfully used to characterize and differentiate closely related strains of bacteria. Repetitive extragenic palindromic (REP), enterobacterial repetitive intergenic consensus (ERIC), BOX sequence-specific primers and ISSR primers were used for the genetic diversity analyses of *Xcm* isolates. Primers such as REP1R-I and REP2-I, ERIC1R and ERIC2, BOXA1R and nine ISSR primers were used for PCR amplifications of specific regions in the genome. Upon gel electrophoresis, significant differences in the distribution of genetic profiles were determined using NTSYS-PC (2.02i) software. Dendrograms were constructed with Jaccard's similarity coefficient with unweighted pair group method clustering (UPGMA) for independent and combined REP, ERIC, and BOX amplifications and ISSR analysis. Principal coordinate analysis (PCoA) was also performed using NTSYS-PC software 2.02i.

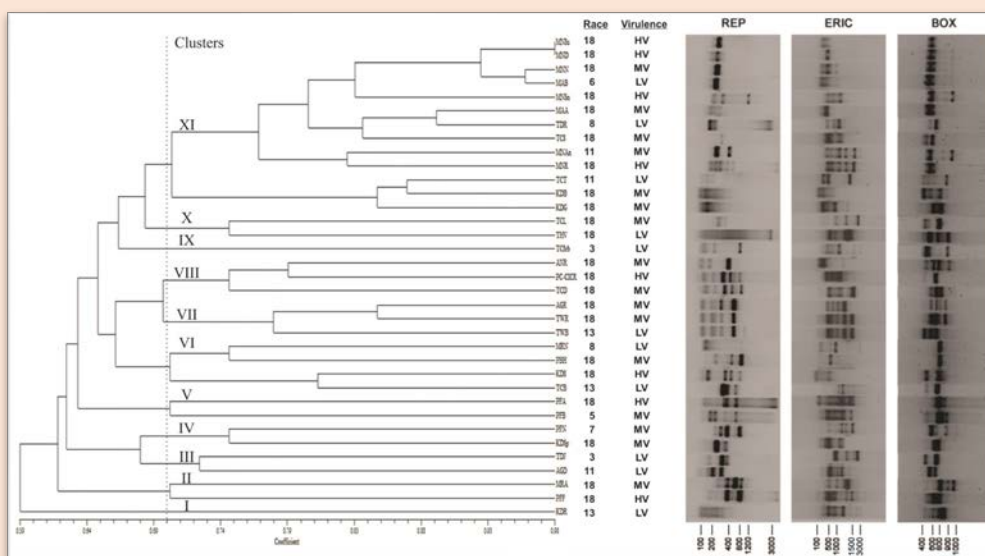
The genetic diversity through PCR analysis of repetitive elements (REP, ERIC and BOX) collectively yielded 428 bands for *Xcm* isolates. Independent REP, ERIC and BOX-PCR yielded 130, 171 and 127 bands with sixteen, twenty and eleven different alleles, respectively. Seven, ten, nine and eleven clusters were formed (**Fig. 3**) at similarity coefficient of 0.70 for REP, ERIC, BOX and combined repetitive elements, respectively. Comparative analysis of repetitive elements (REP, ERIC and BOX) revealed that the maximum polymorphic alleles (20) were generated in ERIC followed by REP (16) and BOX (11), suggesting that ERIC was more informative in assessing the genetic diversity of *Xcm* isolates. Inter Simple Sequence Repeat (ISSR) analysis generated eight clusters among *Xcm* isolates. The PCoA exhibited 76.4% and 77.5% cumulative variability for combined repetitive elements and ISSR primers, respectively. A lot of intra-pathovar variability was observed in virulence and genomic fingerprinting among *Xcm* isolates. The polymorphism may be due to nucleotide modification, insertion and deletion at initiation sites. Genetic variability might have occurred due to unfavourable biotic and abiotic stresses. It was extremely difficult to assign clusters based on virulence or race of the isolates. Many of the isolates were grouped based on geographical origin irrespective of virulence or race. The geographical location of the isolates was highly influencing the virulence and pathogenicity of the isolates. The spread of the pathogen races in India might be due to the transport seed materials from one place to another.



**Fig.1. Different types of bacterial blight symptoms observed during survey (a) angular leaf spot (b) vein blight (c) black arm and (d) oily spot on bolls**



**Fig.1. *Xcm* on NA medium (a) and pathogenicity on susceptible cotton seedlings**



**Fig.3. Dendrogram based on cluster analysis (UPGMA) of the estimate of genetic similarity by combined REP, ERIC and BOX-PCR of *X. citri* pv. *malvacearum* isolates. Clusters are shown at 0.70 similarity coefficient. (Virulence class: HV- highly virulent; MV- Moderately virulent; LV- Less virulent)**

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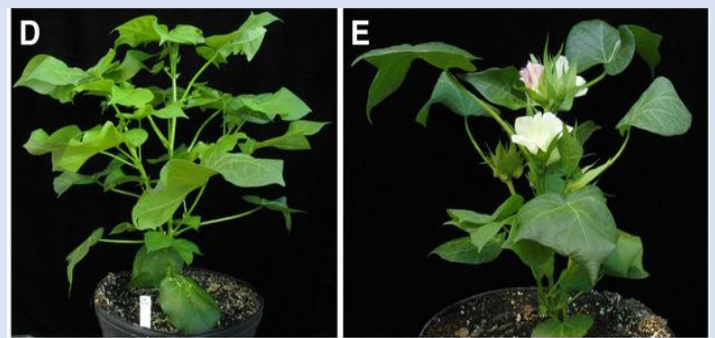
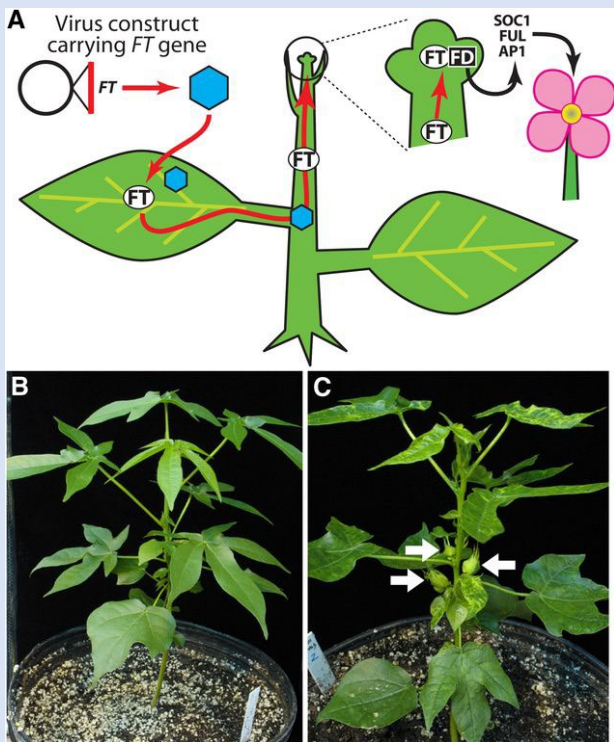
Virus induced flowering: an option for speed breeding in cotton

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Photoperiodism in cotton poses a major challenge for plant breeders in crop improvement. Most of the modern cotton cultivars are day-neutral plants derived from photosensitive ancestors. The selection of day-neutral flowering introduced a genetic bottleneck in most of the crops. In case of upland cotton (*Gossypium hirsutum*), a day-neutral germplasm has one of the narrowest genetic bases of all commodity crops (Iqbal et al., 2001; Paterson et al., 2004). Landraces and wild accessions are important reserves for desirable traits such as tolerance to diseases, pests, drought, and salt, but these are short-day photoperiodic plants. Introducing few traits from land races and wild accessions into cultivated cotton for crop improvement is gaining interest for enriching genetic diversity, but non-synchronization of flowering complicate breeding process and increase costs involved (Saha et al., 2008).

The transition to reproductive growth is mediated by the ectopic expression of FLOWERING LOCUS T (FT) which encodes the long-distance flowering signal florigen (Wenzel et al., 2013). Over expressing FT induces the transition to reproductive growth, uncouples flowering from photoperiod and vernalization requirements (Böhlenius et al., 2006). Use of transgenic lines with precocious flowering coupled with marker-assisted selection (MAS) for desired traits would be one of the approaches for fast track breeding (Weigl et al., 2015). Since transformation strategies in cotton are time consuming and also cotton being a recalcitrant species, the above said option would not be a viable one.



**Virus-induced flowering in Cotton** (adapted from McGarry et al., 2016):  
 Fig. A- Cartoon depicting how VIF works; Fig B. An uninoculated photoperiodic cotton plant (accession TX 701) grown under non-inductive long days (16 h of light/8 h of dark) exhibiting vegetative growth. Fig C. When the cotton FT ortholog, GhSFT (SINGLE FLOWER TRUSS) is delivered from disarmed Cotton leaf crumple virus (dCLCrV), flowering is uncoupled from photoperiod and the transition to reproductive growth is accelerated in accession TX 701. Arrows indicate floral buds; Fig D. An uninoculated day-neutral cotton plant (accession Delta Pine 61) produces robust vegetative growth along with many floral buds. Fig E. Silencing the cotton TFL1 homolog, GhSP (SELF PRUNING) from TRV terminates growth by node 5 with the formation of a terminal flower, and all axillary meristems are converted to flowers. In both C and E, the induced flowers were fertile and set fruit

**Virus-induced flowering in cotton**

Instead of stable transformation, viral vectors have been used to deliver FT orthologs to different crop plants to induce determinate growth patterns and precocious flowering (Fig. A). This approach is very efficient because the FT gene product (florigen), is phloem mobile and naturally enters the shoot apices to influence meristem identity and viruses use phloem as a pathway to establish systemic infections. Therefore, in principle, coupling an FT ortholog with a virus-based vector that can amplify the inserted sequence and move it systemically within the plant will promote flowering. The use of a virus to deliver sequences that promote flowering was termed virus induced flowering (VIF) (McGarry and Ayre, 2012a). Because virus infection progresses through whole plants, techniques for transformation in tissue culture do not need to be developed, and there is no risk of somaclonal variation.

Altering the *GhSFT/GhSP* balance by delivering *GhSFT* made the plants more determinate by overcoming photoperiod requirements and reduced vegetative growth, causing sympodial fruiting branches to terminate in floral clusters. Ectopic expression of *AtFT* from a disarmed cotton leaf crumple virus (dCLCrV) vector uncoupled flowering from photoperiod, accelerated the transition to reproductive growth, and enhanced determinate plant architecture (McGarry and Ayre, 2012b). The induced cotton floral buds were used as pollen donors to successfully introduce exotic germplasm into inbred domesticated varieties. In both cases, the F1 progeny phenotypes were intermediate to both parents, demonstrating the success of the cross. And the advantage is that neither CLCrV nor ALSV was detected in the F1 generation (Mc Garry and Ayre, 2012b). After producing five nodes, the monopodial main stem which normally remains vegetative throughout the life cycle terminated with an apical flower and axillary buds released from apical dominance immediately transitioned to reproductive growth, including those at the cotyledonary node (Fig. D and E; Mc Garry et al., 2016) thus, producing a cotton plant about 20cm tall with no branching with only six flowers. Plants with this phenotype would have little value for field production, but as a breeding tool, this approach could exponentially accelerate the production of pollen, ovules, embryos, and seeds from elite breeding lines of cotton. VIF can be a novel promising tool for speed breeding in crop species like cotton which have long duration and indeterminate in growth habit. It has the potential to circumvent a number of the problems of floral induction through other means.

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## CICR Happenings

### Interface Meeting on Enhancing Cotton Productivity in North Zone: Way Forward

An 'Interface Meeting on Enhancing Cotton Productivity in North Zone: Way Forward' was organized at ICAR-Central Research Institute for Cotton Research (CICR) Regional Station, Sirsa, Haryana on September 07, 2021 on the occasion of "Azadi Ka Amrit Mahotsav" under the Chairmanship of Dr. B. R. Kamboj, Hon'ble Vice Chancellor, CCS HAU, Hisar, Haryana. Dr. S. K. Verma, Head (I/c), ICAR-CICR, Regional Station, Sirsa welcomed the participants and presented the cotton scenario of north zone including the constraints in cotton production. Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur discussed about 'Holistic cotton production and way forward'. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana (Zone-I), Dr. A. H. Prakash, PC-AICRP on Cotton, ICAR-CICR, Regional Station, Coimbatore, Dr. N. S. Bains, Director of Research, PAU, Ludhiana, Dr. S. K. Sehrawat, Director of Research, CCS HAU, Hisar, Dr. P. S. Shekhawat, Director of Research, SKRAU, Bikaner, Dr. S. S. Siwach, Member of RAC, ICAR-CICR also expressed their views on increasing cotton productivity in North Zone. Dr. R.K. Singh, ADG (CC), ICAR, New Delhi made a special address about 'How to fill yield gap of cotton and problem of pink boll worm in North Zone'. Dr. Hardeep Singh, Director General, Dept. of Agriculture and Farmers' Welfare, Govt. of Haryana made a special address about problems in cotton cultivation through online mode. A keynote address on cotton was presented by the chief guest of the programme Dr. B. R. Kamboj, Hon'ble Vice Chancellor, CCS HAU, Hisar. A total of 106 participants from various stakeholders like CCS HAU, SKRAU, KVKs, State Agriculture Departments of Punjab, Haryana and Rajasthan, progressive farmers and seed companies have attended the programme in physical as well as online mode. The Chairman emphasized to constitute a high-powered interstate committee for enhancing cotton productivity with strategic district level planning and recommendation to state governments.



### In-season training on Desi cotton production

Under the aegis of "Azadi ka Amrut Mahotsav", one day in-season training on *Desi* cotton production was organized at ICAR-CICR, Nagpur on September 7, 2021. It was conducted as a part of tri-partite agreement between ICAR-CICR, Nagpur, VNMKV, Parbhani and Better cotton initiative (BCI) for conducting demonstrations of *desi* cotton in Jalna, Parbhani and Aurangabad districts. Inaugural session of the training was chaired by Dr D. Blaise, who addressed the participants emphasizing on the potential of *desi* cotton in sustaining cotton production. During the training, the participants were explained about importance of timely field operations and optimum plant population for achieving potential yield.



They were also trained for sampling for pink boll worm and boll rot detection. The trainees were taken for field visit where they got practical exposure for recording different plant growth parameters. Concluding session was chaired by Dr. V.N. Waghmare, where participants also gave their feedback of the training program. The training was coordinated by Dr. MV Venugopalan, Dr. Ramkrushna GI, Dr. Rachna Pande, Dr. Vivek Shah and Dr. Neelakanth Hiremani.

### Hindi Week celebration at ICAR-CICR

'Hindi Week' was celebrated at ICAR-CICR, Nagpur during September 07-14, 2021. The programme was inaugurated by Dr. Blaise Desouza, I/c Director, ICAR-Central Institute for Cotton Research, Nagpur. Dr. Blaise addressed the institute staff and requested the officers and employees to participate in great numbers and make this event a success. During the week, different Hindi competitions were organized each day, in which ICAR-CICR staff including Scientists, technical, administrative and others participated in large number. The closing ceremony was organized on September 14, 2021 which was chaired by Dr. Y. G. Prasad, Chairman, Official Language Implementation Committee of the Institute & Director, ICAR-CICR, Nagpur. Dr. Nandini Gokte Narkhedkar, Head, Crop Protection Division, Dr. S. N. Rokde, Principal Scientist and I/c KVK Nagpur, Shri. A. A. Goswami, Senior Administrative Officer and Dr. Mahendra Kumar Sahu, Assistant Chief Technical Officer, ICAR-CICR, Nagpur graced the programme. Dr. Y. G. Prasad, Director, ICAR-CICR mentioned that the institute has received the prestigious Rajarshi Tandon Rajbhasha Puraskar (first place) of the Council continuously for three years for doing remarkable work in the field of Official Language Hindi. Dr. Mahendra Kumar Sahu, and Dr. Pooja Verma coordinated the programme. The Hindi week celebrations were also organized at ICAR-CICR Regional Station, Coimbatore during September 27-28, 2021 and ICAR-CICR Regional Station, Sirsa during September 07-14, 2021. The scientists and staff took part actively in different competitions and the prizes were awarded to the winners.



### Visit of DDG (NRM) to ICAR-CICR

Dr. S. K. Chaudhari, Hon'ble DDG (NRM), ICAR visited ICAR-CICR, Nagpur on September 16, 2021. During the field and laboratory visit, he interacted with scientists and reviewed the progress of research. Later he addressed the farmers who were participating in the Pink Bollworm Awareness programme organized by Agrovision Foundation and ICAR-CICR. During the interaction session, Dr. Chaudhari and Dr. C. D. Mayee, Former Chairman, ASRB addressed the scientists through hybrid mode wherein they underlined the potential researchable areas to focus for breaking yield barriers.





## MGMG Farmers training cum CICR Cotton -Variety Exo programme

MGMG Farmers training cum CICR Cotton -Variety Exposure programme was organized at ICAR-CICR, Regional Station, Sirsa on September 17, 2021. Dr. Rishi Kumar, Dr. S.K. Sain and Dr. Amarpreet Singh delivered lectures and interacted with the farmers on crop production and protection aspects of cotton and Rabi crops like wheat and mustard. About 20 farmers from Chaharwala, Khedi, Hanjira and Chadiwal of District of Sirsa visited the 'Technology Demonstration Park' of the station. They were explained on the Desi and American cotton hybrids and varieties developed by ICAR-CICR. Small packets of Trichoderma powder were also distributed among the farmers for seed and soil treatment.



## Campaign on Nutri-Garden and Tree Plantation

Campaign on Nutri-Garden and Tree Plantation was organized at Vadapudur Village on September 17, 2021 by the ICAR-Central Institute for Cotton Research, Regional Station, Coimbatore to create awareness among the girl students and farmers in embracing the International Year of Millets 2023. Mr A. Ashok Kumar, Vadapudur Panchayat President graced the occasion as the guest of honour and around 25 girl students from the Panchayat High school and 40 farmers participated the event. Dr. A H Prakash, PC & Head in his address highlighted the significance and nutritional value of millets and encouraged the school students to include them in their diet. He also motivated the farmers to grow more millets as the demand is increasing especially in the urban areas due to lifestyle diseases and changing food habits. Dr. Rathinavel, Principal Scientist gave a detailed account on the cultivation, importance, and nutritional value of finger millet, kodo millet, foxtail millet, little millet, barnyard millet, pearl millet, sorghum, and proso millet. The participants were provided with biscuits and sweets made of millets during the program. Tree planting by the girl students was organized at Vadapudur village after the lectures. Dr Usharani and Dr Rameash coordinated the programme.

Campaign on Nutri-Garden and Tree Plantation was also organized at CICR RS, Sirsa. Dr. S. K. Verma, Head (I/c), ICAR-CICR RS, Sirsa explained the use and benefits of millets in food and nutrition security and tree plantation for the benefit of mankind. Dr. S. K. Sain, Principal Scientist (Plant Pathology) explained about the Nutri-Garden (Home Garden) design and cultivation of nutritious crops including vegetables, fruit plants and their uses for a healthy life. Dr. Amarpreet Singh, Scientist (Agronomy) explained the cultivation of millets and their package of practices. Dr. Rishi Kumar, Principal Scientist (Entomology) explained the importance of millets in human health. More than 120 participants including all staff members, students and farmers participated in the programme. Plants were also distributed to the farmers and students for plantation.





### H.E. (Ms) Grace Akello, High Commissioner of Uganda visits ICAR-CICR, Nagpur

High Commissioner of Uganda H.E. (Ms) Grace Akello along with two senior staff of embassy in New Delhi visited ICAR-Central Institute for Cotton Research (CICR), Nagpur during 20-21, September 2021. The delegation visited the cotton field experiments laid out in the research farm and interacted on seed production and multi-location testing of cotton cultivars, organic farming, high density planting system, efficient resource management and crop protection technologies. The ambassador visited the insectary and was appraised on monitoring and biocontrol of pink bollworm and diseases in cotton. The delegation evinced keen interest in farm machinery and implements such as pneumatic planter, cotton stalk shredder, boom sprayer and reversible plough.

H.E. (Ms) Grace Akello explained the purpose and priorities of her visit during the interaction session with Heads of Division and Scientists. In view of the importance of cotton in the economy of both the countries, the ambassador was keen on receiving inputs and experience of India for reviving cotton production, processing and value chain in Uganda. There was a discussion regarding various aspects of cotton sector in both the countries and interventions undertaken with reference to Cotton Technical Assistance Programme (Phase - I). Earlier, Dr Y.G. Prasad, Director, ICAR-CICR presented an overview of cotton scenario highlighting cotton research in India during the interaction session with the ambassador. An exhibition was organized showcasing the various technologies developed by ICAR-CICR and later a tree was planted by the visiting dignitary. A visit to bio-fertilizer and bio-pesticide production units and seed processing plant was organized in the post-lunch session.



On the second day, a visit was organized to Ginning and Training Centre (GTC) of ICAR-CIRCOT Nagpur where the focus was on processing, testing and value addition in cotton and by-products development. This was followed by a visit to the Bajaj Steel Industries where the entire process of ginning machinery manufacture was showcased. In the post lunch session, the ambassador visited Morarjee Textiles to appraise on modern infrastructure for spinning and garment making. The visit ended with a Wrap Up session at ICAR-CICR in which the programme was summarized.

## Distribution of inputs to farmers of Parsheoni cluster under MGMG and TSP programmes

Team of scientists consists of Dr. P.R. Vijayakumari, Dr. A.R. Reddy, Dr. J. Amudha, Dr. K.P. Raghavendra, Dr. Vivek Shah visited adopted villages under *Mera Gaon Mera Gaurav* programme on September 24, 2021. The team distributed inputs like yellow sticky traps, pheromone traps with lures and insecticides (thiamethoxam and lambda cyhalothrin) for monitoring and management of pink bollworm and sucking pests. The practices to be carried out in the demonstrations were explained to the farmers. Scientists also suggested spacing, fertilizer and pest management options available for better cotton crop management to be followed and the benefits of using varietal seeds over hybrids. Earlier, during June, 2021, the seeds of ICAR-CICR Bt cotton varieties viz., Suraj Bt (20), Rajat Bt (20) and PKV 081Bt (10 bags of 2 kg each) along with pigeon pea seeds (50 bags of 2 kg each) were provided to 100 tribal farmers as critical input. In addition, vegetable seed kits were also distributed to 50 beneficiary tribal farmers under Tribal Sub Plan (TSP).



**Distribution of seeds of Cotton, Redgram, Vegetable kits, Pheromone Traps with lures, Yellow Sticky Traps & PP chemicals at Parsheoni cluster villages**

## Farmers'-Scientists'-Interface Meeting on "Climate Resilient Varieties, Technologies and Practices"

Under Azadi Ka Amrut Mahotsav, a Farmers-Scientist Interaction meet was organized on Cotton production and protection technologies on 28 Sept 2021 in the Training Hall of ICAR-CICR, Nagpur. Dr. Vikas Mahatme, Member of the Parliament in Rajya Sabha was the chief Guest for the occasion. This was followed by the address by the Hon'ble Prime Minister of India - "Dedication to the Nation of 35 Crop Varieties and ICAR – National Institute of Biotic Stress Management, Raipur" witnessed by 100 participants. The ICAR-CICR, Regional Station, Coimbatore, Tamil Nadu, organised Farmers Meet at Vadapudur Village in Coimbatore, Tamil Nadu in which 40 farmers participated. The ICAR-CICR, Regional Station, Sirsa organized the program involving 45 participants.





### Visit of Leaders of Cotton Co-operative Societies of South Gujarat at ICAR-CICR, Regional Station, Sirsa

A delegation of 25 leaders of Cotton Co-operative Societies of South Gujarat visited the ICAR-CICR, Regional Station, Sirsa, on September 28, 2021. Dr. Solanki from Surat, Gujarat; Mr. B. D. Chauhan, President, Cotton Federation of South Gujarat; Mr. Jayeshbhai N. Patel, Director, Cotton Association of India, Mumbai and Mr. Mahendrabhai C. Patel, Chairman, Surat District Spinning Mill, Gujarat were amongst them. Dr. S. K. Verma, Head (I/c), ICAR-CICR, Regional Station, Sirsa, presented about the latest cotton scenario of North Zone and activities of the station.

Visit of 'Technology Demonstrations Park' was organized by the scientists of the station and the varieties and hybrids of *Desi* and American cotton developed by ICAR-CICR, Regional Station, Sirsa, were showcased. Mr. B. D. Chauhan, President, Cotton Federation of South Gujarat, Mr. Jayeshbhai N. Patel, Director, Cotton Association of India, Mumbai and Mr. Mahendrabhai C. Patel, Chairman, Surat-District Spinning Mill, Gujarat planted the samplings at CICR, RS, Sirsa. Dr. Hamid Hassan, In-charge, ICAR-CIRCOT Unit, Sirsa presented about the quality of cotton in North India.



**ICAR-CICR, Regional Station, Sirsa**

## Activities by ICAR-CICR under different schemes (Tribal Sub-Plan, SCSP, IRM, etc.)

The programmes organized under different schemes during the month of September 2021 are as follows.

S. No.	Programme	Date	Place	Participants	Coordinated by	Under the scheme
1	"Farmers Field Training cum Input Distribution"	September 3, 2021	Village-Muradpur, Taluka-Umred, Dist.- Nagpur (M.S.)	More than 80 farmers	Dr Dipak T. Nagrale, Dr. Subhash S. Patil	NFSM: IRM-PBW
2	"Farmers Training cum Awareness campaign" for the management of pink bollworm"	September 16, 2021	ICAR-CICR, Nagpur (M.S.)	More than 60 farmers	Dr. Dipak T. Nagrale, Dr. Ramkrushna G.I, Dr Babasaheb B. Fand, Dr. S. P. Gawande	NFSM: IRM-PBW
3	"Farmer-Scientist Interface cum Tree Planation Program" on the occasion of <i>Poshan Vatika Maha Abhiyan</i>	September 17, 2021	Village-Dhurchheda-Taluka-Umred, Dist.-Nagpur (M.S.)	More than 180	Dr. Shailesh Gawande, Dr Sunil Mahajan, Dr. Neelkanth S. Hiremani	SCSP
4	"Farmers Training cum Exposure visit and distribution of inputs"	September 30, 2021	KVK-CICR, Nagpur (M.S.)	More than 50 farmers	Dr. V. Chinna Babu Naik, Dr. Dipak T. Nagrale,	TSP

During these programmes, experts from ICAR-CICR interacted with the farmers and advised them about the schemes, integrated management of pink bollworm, boll rot disease complex, nutrient and fertilizer management, installation of pheromone traps for pest monitoring and mass trapping etc.



## Scientists' Corner

### Publications, Awards, Recognitions and special assignments

- Blaise, D. (2021) Nitrogen loss from plants – an ignored aspect. *Current Science* 121(5) 613-614.
- Blaise, D. (2021) Nitrogen use efficiency in crops with new and available technologies. *Annals of Plant and Soil Research* 23(3): 256-266
- Blaise, D. (2021) Cotton (*Gossypium* species) production systems of India: Historical perspective, achievements and challenges. *Indian J of Agronomy* 66: 125-134

### Participation of scientists in Training/seminar/conference/symposia/etc.

- ✓ Dr. S. K. Verma, Principal Scientist (Plant Breeding) and Head, (I/C), ICAR-CICR, Regional Station, Sirsa & Dr. Rishi Kumar, Principal Scientist (Entomology) attended 2<sup>nd</sup> Interstate Consultative Committee Meeting on September 02, 2021 through video conference. Dr. S.K. Verma presented the North zone cotton scenario and Dr. Rishi Kumar presented the pest scenario including the menace of pink bollworm.
- ✓ Dr Dipak Nagrale, Scientist (Plant Pathology) delivered an interactive lecture dated September 03, 2021 on 'Integrated Disease Management in Cotton' and *Corynespora* leaf spot disease in the region organized at Village-Muradpur, Nagpur in "Farmers Field Training cum Input Distribution" under NFSM: IRM-PBW.
- ✓ Dr. Y. G. Prasad, Director, ICAR- CICR, Nagpur convened a meeting to take stock of crop situation in farmers fields and ICAR-CICR farm and to prepare pro-active crop management strategies during the month of September. All the Heads of Divisions, Dr M V Venugopalan, Dr VS Nagarare, Dr V Chinna babu Naik, Dr Ramkrushna, Dr Rachna Pande, Dr Shailesh Gawande, Dr B Fand, Dr Vivek shah, and Dr Dipak Nagrale attended the meeting on September 04, 2021.
- ✓ Dr. Rishi Kumar, Principal Scientist (Entomology) and Dr. S. K Sain, Principal Scientist (Plant Pathology), ICAR-CICR, Regional Station, Sirsa attended brain storming session on "Farming situation wise-constraint analysis and future prospects for improving cotton productivity in Andhra Pradesh" organized by Acharya N. G. Ranga Agricultural University on September 08, 2021 through video conference.
- ✓ Dr. Amarpreet Singh, Scientist (Agronomy) attended the "DLEC (District Level Executive Committee) meeting on "Promotion of Agriculture Mechanization for In-situ Management of Crop Residues" for the State of Punjab, Haryana, Uttar Pradesh and NCT of Delhi on September 14, 2021 at Mini-Secretariat, Sirsa, Haryana.
- ✓ Dr. S. K. Verma, Principal Scientist (Plant Breeding) and Head, (I/C), ICAR-CICR, Regional Station, Sirsa & Dr. Rishi Kumar, Principal Scientist, (Entomology) attended 3<sup>rd</sup> Interstate Consultative Committee on September 15, 2021 at Kheti Bhawan, Bathinda. The meeting was chaired by Director of Agriculture, Punjab State Agriculture Department, Dr. Sukhdev Singh, Additional Director of Research, PAU, Ludhiana, Chief Agriculture Officers of cotton growing districts of Punjab and Scientist from PAU, Ludhiana, CCS HAU, Hisar, SKNRAU, Sriganaganagar and Krishi Vigyan Kendras participated in the meeting.
- ✓ ICAR-CICR, Nagpur and Agrovision Foundation, Nagpur jointly organized pink bollworm awareness campaign for farmers on September 16, 2021 under the chairmanship of Dr. Suresh Chaudhari, DDG, NRM ICAR, New Delhi. Dr. Y. G. Prasad, Director, ICAR- CICR, Nagpur, Dr C. D. Mayee, Ex-ASRB Chairman graced the programme. Dr BB Fand, Dr. Shailesh Gawande, Dr Ramkrushna G.I. also participated and imparted training to farmers. The programme was organized under NFSM: IRM-PBW.

- ✓ A programme was organized by KVK, ICAR-CICR, Nagpur in the training hall on Curtain Raiser of “International Year of Millets 2023” on September 17, 2021. This programme was inaugurated by Hon’ble Shri Narendra Singh Tomar, Minister of Agriculture and Farmers’ Welfare, Govt. Of India. All the staff of ICAR-CICR, RAs, SRFs, Young professional I & II participated in this programme.
- ✓ Dr. Vivek Shah, Scientist (Ag. Entomology); Dr Dipak Nagrale, Scientist (Plant Pathology); Dr. Neelkanth Hiremani, Scientist (Plant Pathology) and Dr. Shailesh Gawande, Scientist (Plant Pathology) provided guidance on IPM of sucking pests and bollworm complex in cotton, boll rot disease complex with their IDM strategies, foliar diseases of cotton and its management and on safe handling of pesticides, respectively in “Farmer-Scientist Interface cum Tree Planation Program” on the occasion of Poshan Vatika Maha Abhiyan dated September 17, 2021 at village-Dhurkheda, Nagpur under SCSP scheme.
- ✓ Dr. S. K. Verma, Principal Scientist (Plant Breeding) and Head, (I/C), ICAR-CICR, Regional Station, Sirsa attended Kisan Goshthi on ‘Improved crop production & protection technology’ on cotton cultivation on September 21, 2021 at village Palwan (Jind) and presented the action plan for management of pink bollworm and asked the farmers, state agriculture department for massive program for its monitoring and management.
- ✓ Dr. Y. G. Prasad, Director, ICAR- CICR, Nagpur attended the 87th Meeting of the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops under the Chairmanship of Deputy Director General (CS), ICAR through video conferencing on September 22, 2021.
- ✓ Monthly meeting of IRM: Dissemination of PBW Management Strategies was organized by ICAR-Central Institute for Cotton Research, Nagpur on September 23, 2021 through video conferencing under the chairmanship of Dr Y G Prasad, Director, ICAR-CICR, Nagpur. In this meeting centre wise implementation of the project with respect to collection of baseline survey, distribution of critical inputs, sending voice messages (Contents and number), submission of monthly progress report, pest data in Google form, overall pest and boll rot status, crop condition etc, were discussed.
- ✓ Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur along with Dr. S. N. Rokde, Head KVK participated in the programme organized under Azadi Ka Amrut Mahotsav on Cotton Production and Protection Technologies on September 28, 2021. Technical session was coordinated by Dr BB Fand, Dr DT Nagrale, Dr SP Gawande, Dr Ramakrushna GI and Dr UV Galkate.
- ✓ Dr. S. K. Verma, Principal Scientist (Plant Breeding) and Head, (I/C), ICAR-CICR, Regional Station, Sirsa & Dr. Rishi Kumar, Principal Scientist, (Entomology) attended a meeting of stakeholders for pink bollworm management under the chairmanship of Hon’ble Vice Chancellor, CCSHAU, Hisar on September 29, 2021. In the meeting Dr. S. K. Verma, Head (I/c), ICAR-CICR Regional station, Sirsa presented the action plan for the management of pink bollworm in the ensuing season.
- ✓ Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur guided farmers on the topic "Cotton- Pink bollworm and Boll rot Management" in 53rd Session of Agriculture Department YouTube channel, Government of Maharashtra through zoom meeting on September 30, 2021.
- ✓ Dr. V. Chinna Babu Naik, Senior scientist (Ag. Entomology) and Dr Dipak Nagrale, Scientist (Plant Pathology) explained the IPM strategies for the integrated management of pink bollworm and sucking pests, boll rot disease complex and Corynespora leaf spot disease management in cotton, respectively to tribal farmers in “Farmers Training cum Exposure visit and distribution of inputs” dated September 30, 2021 under TSP scheme organized at KVK-CICR, Nagpur.

## Farmers' Corner

### Success story on cultivation of NHH44 BGII, a sucking pests and drought tolerant Bt cotton hybrid at Marathwada region

Shri Madhukar Pawade, a cotton farmer from Pawade Wadi village of Nanded District cultivates Bt cotton hybrids in his farm land. But the low productivity with poor economic returns due to severe incidence of sucking pests and dry spells during July and August compelled him to search for a good Bt cotton hybrid with tolerance to sucking pests and drought.

Inspired by the Scientists of Cotton Research Station, Nanded, VNMKV, Parbhani, he cultivated the Intra-*hirsutum* hybrid NHH44 BGII developed through joint venture of VNMKV, Parbhani and MSSCL, Akola in 2018-19 season under National Food Security Mission – Cotton Front Line Demonstrations. He cultivated the cotton hybrid NHH44 BGII under rainfed condition with intercrop of Green gram (1:1).

**Farmer: Shri Madhukar Pawade,**  
**Village: Pawade Wadi**  
**Taluk: Nanded,**  
**District: Nanded**  
**Mobile Number: 9922546983**



The NFSM – Commercial Crops – FLD facilitated the cotton growers from problematic and low productivity areas to cultivate cotton with improved technologies under the guidance and monitoring of cotton research scientists. Shri Madhukar Pawade was a beneficiary of this program during 2018-19 season. He cultivated NHH44 BGII under the close supervision of cotton scientists from CRS, Nanded. The regular visits and advisories of the Scientists from CRS, Nanded helped the farmer to undergo an effective learning situation as he could interact with the scientists at his field and get effective and timely recommendations for managing sucking pests and drought. The hybrid was found to be tolerant against sucking pests and hence he could minimize the expenses on plant protection with reduction in the usage of pesticides. Similarly, NHH44 BGII was found to have better drought tolerance than the Bt cotton hybrids he cultivated earlier. He observed that NHH44 BGII had a special characteristic of rejuvenating after stress and could realize the benefits of second flush emerged due to later rains after withdrawal of monsoon. He harvested 1325 kg of seed cotton yield along with 550 kg of green gram yield (seed cotton equivalent yield 2003 kg/ha) from one hectare of his rainfed farm as against the regular farmers' practice of that region i.e., cultivating sole cotton (1510 kg/ha). He received an additional net monetary return of Rs. 21,603 per ha with Benefit Cost ratio of 1.54 by cultivating NHH44 BGII along with green gram as intercrop. He strongly believes that by cultivating NHH44 Bt cotton hybrid, cotton farmers can reduce the cost of cultivation and get higher yields.

Information provided by  
Dr. K. S. Baig  
Cotton Specialist, Cotton Research Station, (VNMKV), Nanded,



## Cotton Statistics and Trade

### Cotton Price Scenario

A. R. Reddy & Isabella Agarwal

Cotton season 2021-22 started with a favourable price scenario. Majority of the cotton markets reported the cotton prices above MSP. The average price of seed cotton during first week of September 2021 was Rs. 6963/q, whereas there was a marginal decrease during the second week. By the end of third week, it came down to Rs. 6556/q. Seed cotton prices witnessed an upward movement for the next three weeks and by the second week of October, it reached to all-time high price of Rs. 7331/q. This gain couldn't sustain further and seed cotton prices steeply reduced to Rs. 6607/q during the third week of October 2021. It is expected that strong domestic demand and lower prospects of current cotton season as well as better international price scenario may keep the cotton prices above the MSP in the coming weeks.

Weekly scenario of cotton prices in India (Rs. /q)

State	Sep 01-08, 2021	Sep 09-15, 2021	Sep 16-23, 2021	Sep 24-30, 2021	Oct 01-08, 2021	Oct 09-15, 2021	Oct 16-23, 2021
Punjab	6455	6551	6553	6636	6995	6827	6818
Rajasthan	6649	6606	6714	7061	7388	7804	8249
Haryana	--	--	--	--	6400	6877	
Gujarat	6275	6153	5959	5530	6178	6584	7241
Madhya Pradesh	6128	5176	4558	4755	5496	5769	5276
Maharashtra	---	---	5130	5147	5180	6568	6100
Karnataka	9292	10029	9970	10920	11077	10673	8166
Tamil Nadu	6980	7105	7004	6947	6703	7551	4400
Average	6963	6937	6556	6714	6927	7331	6607

Source: [https://agmarknet.gov.in/PriceTrends/SA\\_Pri\\_Month.aspx](https://agmarknet.gov.in/PriceTrends/SA_Pri_Month.aspx)

### World Cotton Scenario

Global cotton output is seen rising by 6 per cent with expected rise in the output in the growing countries of Australia, Brazil and the US. ICAC has indicated that the global output of the fibre crop will be around 25.7 million tonnes (mt), which would be higher by six per cent over previous year, but still be lower than the pre-pandemic levels. India's cotton scenario is likely to be bright. Global prices initially dipped during the first half of the month, mostly due to global macro-economic concerns. The surge of speculative buying has mostly been attributed to higher prices. All cotton put up for sale in September by China's State Reserve has been sold out for the third consecutive month, signifying robust demand for nearby supplies.

Cotton production in the major cotton producing countries is expected to increase except China during 2021-22. Cotton Corporation of India (CCI) has procured around 92 lakh bales of cotton during the ongoing 2020-21 season. CCI may be required to procure minimal amount of cotton in the 2021-22 season, as cotton prices are likely to rule above MSP for a better part of the season. CCI is planning to procure around 30 lakh bales in 2021-22 season.

लोकमत

कपाशीवरील गुलाबी बोंडअळी व्यवस्थापन कार्यक्रम

लोकमत न्यूज नेटवर्क
बेला : सीआयसीआर सेंट्रल इन्स्टिट्यूट ऑफ रिसर्च - केंद्रीय कापूस संशोधन संस्था, नागपुरच्या तऱ्हेने उमरेड तालुक्यात नुकताच कपाशीवरील गुलाबी बोंडअळी व्यवस्थापन कार्यक्रमाचा सुरुवात झाली. यात दख्खणी रोगात जाऊन शेतातून काढलीलेले गुलाबी बोंडअळी, सर शोभा कृष्णाई वॉर्ड व वॉर्डस व्यवस्थापनाबाबत विस्तृत माहिती देऊन...



कपाशीवरील गुलाबी बोंडअळीच्या व्यवस्थापनाबाबत शेताच्या कामांमध्ये प्रशिक्षण देण्यात येऊन...

Helo Nagpur Gramin Page No. 4 Sep 16, 2021 Powered by: etelogo.com

केंद्रीय कपास अनुसंधान के क्षेत्रीय स्टेशन में पोषण वाटिका महाभियान एवं पौधासोपण कार्यक्रम का आयोजन

वैज्ञानिकों ने किसानों को डी पोषण में मिलेट्स (मोट अनाज) तथा पोषण वाटिका के महत्व की जानकारी

आत तक हरियाणा
सिरसा: शाहवादी जैत गांव के जमींदार व कृषि विभाग के डॉ. कृष्ण मोहन ने अंतर्गत-मिलेट अनाज वर्ष 2023 का नवंबर विभाग, सिन्धुवा केंद्र के कृषि अनुसंधान संस्थान के क्षेत्रीय स्टेशन के अध्यक्ष के रूप में श्रेष्ठ प्रदर्शन के लिए प्रशिक्षण देकर अनाज का प्रचार किया है।...



वैज्ञानिकों ने किसानों को डी पोषण में मिलेट्स (मोट अनाज) तथा पोषण वाटिका के महत्व की जानकारी

Pink Bollworm Control campaign for cotton launched in Vidarbha

Business Bureau

COTTON is produced in Maharashtra on about 42 lakh hectares, out of which 96 per cent cotton is produced in 20 districts. It also includes some important districts of Vidarbha. In the past few years, B1 cotton has been plagued by pink bollworm and has been causing difficulties to cotton growers.



to launch the campaign. This year, Angrovision Foundation, SARC, Rasi Seeds and PI Foundation are jointly implementing the 'Bandhan' project in an area of about 300 acres in the villages of Adasa, Varoda and Montpanja.

ICAR-CICR holds 'Poshan Vatika Maha Abhiyan'

Staff Reporter

ICAR-Central Institute for Cotton Research (ICAR-CICR) conducted 'Poshan Vatika Maha Abhiyan' and one-day workshop on Integrated Pest and Disease Management in Cotton under the Scheduled Caste Sub-Plan at Dhurkheda village in Umred Tahsil recently.



Scientists and officials during 'Poshan Vatika Maha Abhiyan'.

erred the talk on identification and management of leaf spot diseases of cotton. Dr. Shallesh Gawande delivered lecture on safe handling of pesticides and urged the farmers for strict adherence of label claim.

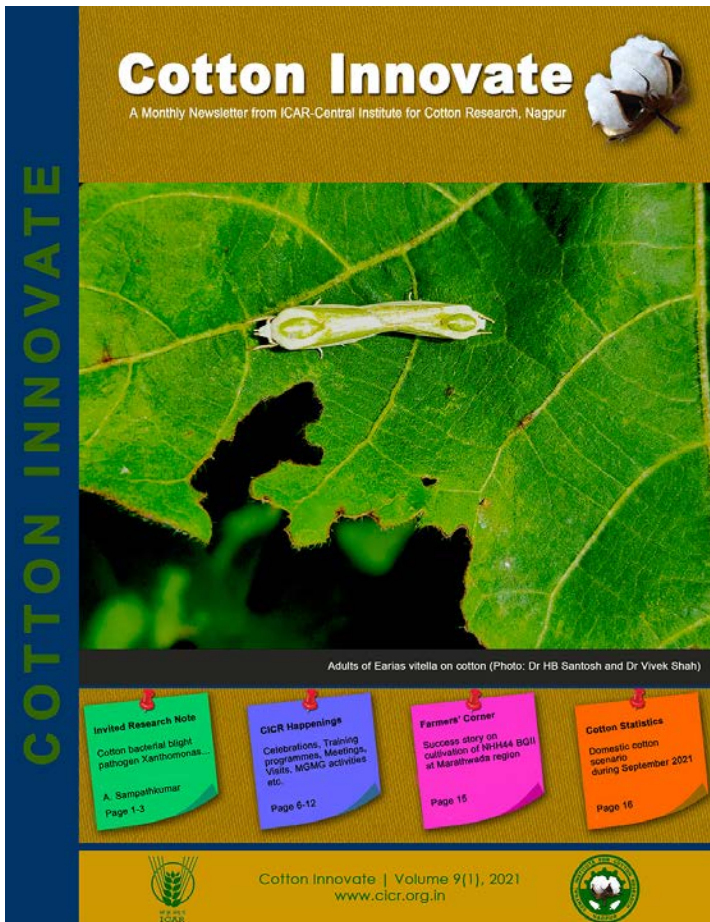
On the occasion, Animal Husbandry, Dairy Business Development and Sports and Youth Welfare Minister, Government of Maharashtra Sunil Kedar flagged off the 'Chitrarathi'...

regarding advisories for cotton cultivation. Later in the technical session, Dr. Viteek Shah, Entomologist, provided guidance on integrated management of cotton sucking pests and bollworm.

लोकमत
धुरखेडा येथे शेतकरी-शास्त्रज्ञ संवाद
विविध विषयांवर मौलिक मार्गदर्शन
लोकमत न्यूज नेटवर्क
उमरेड : केंद्रीय कापूस संशोधन संस्थेच्या वतीने धुरखेडा येथे पोषण वाटिका महाभियानांतर्गत शेतकरी-शास्त्रज्ञ संवाद कार्यक्रम आयोजित करण्यात आला.

सिरसा केसरी
'कम लागत अधिक गुणवत्ता परत उत्पादन व शुद्ध लाभ को बढ़ावा देना ही कपास अनुसंधान केंद्र का लक्ष्य'
सिरसा, 7 सितम्बर (माहिती) : डॉ. कृष्ण मोहन यांच्या अध्यक्षतेखाली सिरसा येथे कपास अनुसंधान केंद्राच्या वतीने 'कम लागत अधिक गुणवत्ता परत उत्पादन व शुद्ध लाभ को बढ़ावा देना ही कपास अनुसंधान केंद्र का लक्ष्य'...

जागरण
जागरण सिटी सिरसा
फसल उत्पादन बढाने के लिए योजना बनाकर कार्य करें किसान : डा. कांबोज
उत्तर भारत में कपास का उत्पादन बढ़ाने के लिए कृषि विज्ञानियों ने किया मंथन
उत्पादन बढ़ाने से किसानों की आयदनी भी बढ़ेगी
उत्तर भारत में कपास का उत्पादन बढ़ाने के लिए कृषि विज्ञानियों ने किया मंथन



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