

81ST PLENARY MEETING

MUMBAI, INDIA

2-5 December 2023

Cotton Value Chain:
"Local Innovations for Global Prosperity"



MINUTES

EIGHTH OPEN SESSION

Genetics, Diversity to Enhance Cotton Productivity
THURSDAY, 5 DECEMBER, 8:00 TO 10:00

Chair: Mr Suresh Kotak, Past President, Cotton Association of India
Co-chair: Dr MV Venugopalan, former principal scientist, Central Institute for Cotton Research

The meeting began at 8:00.

Cotton South Africa's Dr Annette Bennett discussed various aspects related to seeds, genetic diversity, germplasm exchange, and cotton breeding. She highlighted that access to genetic diversity is crucial for cotton farming success, more so than physical seed quantities. To facilitate germplasm exchange and promote cotton breeding, long-term financial support, storage guidelines, and multinational collaboration are essential. However, multinational companies often limit access to their patented germplasm, hindering the exchange of genetic resources. Developing 'early-maturing' cotton cultivars and improving germplasm access can help overcome challenges in different climates and regions. Dr Bennett emphasised the need for funding, research on alternative plant material, and the availability of molecular tools to determine genetic variation within germplasm. She concluded that promoting germplasm exchange and fostering collaboration are key to advancing cotton breeding and production programs.

Bayer Crop Science's Dr PJ Suresh discussed innovations in cotton seed technology for sustainable and economically viable cotton production. He highlighted various approaches, including genome editing, plant breeding, and genetic engineering, to improve cotton seed traits such as insect resistance, disease tolerance, herbicide tolerance, water use efficiency, and more. These innovations aim to reduce pesticide use, protect biodiversity, and enhance crop resilience. Dr Suresh emphasised the importance of precision breeding, which involves using genomic data and predictive models to develop cotton varieties with specific traits. This approach enables better phenotyping, larger breeding pipelines, and improved prediction models. He mentioned that global technologies like seed chipping, genetic mapping, and predictive analytics are being used for cotton seed improvement. To ensure success, Dr Suresh suggested prioritising key

requirements for different regions, fostering partnerships, establishing coalitions for research and development, addressing policy and regulatory issues, allocating resources, and implementing sustainability awareness and education programs. He concluded that innovations in cotton seed technology, including genetic modifications and precision breeding, have the potential to increase productivity, reduce input costs, and promote environmental sustainability in cotton farming.

Dr Samir Sawant, CSIR-NBRI, discussed biotechnological interventions for improving cotton productivity. Cotton is a vital natural fibre crop globally, particularly in India, where it faces various environmental challenges and stress factors affecting its yield. To address these issues, Dr Sawant's research team developed a bio stimulant that significantly increased cotton yield by more than 10% in multiple genotypes across various locations. This bio stimulant works by enhancing the actions of phytohormones related to cotton boll development. In addition, whole genome re-sequencing of 320-core Indian cotton germplasms led to the identification of more than 3.5 million high-quality SNPs/Indels. Through genome-wide association studies (GWAS), Dr Sawant's team discovered over 150 potential markers associated with important agronomic traits such as fibre yield, boll weight, fibre quality, and resistance to pests. Their next steps involve validating these markers and developing cotton varieties using molecular-assisted breeding techniques. Furthermore, they addressed the issue of cotton's indeterminate growth by engineering cotton shoot architecture, creating genome-edited lines with promising traits like clustered bolls, compact shoots, determinate/semi-indeterminate growth, and early flowering. These edited lines are expected to contribute to the development of cotton varieties suitable for high-density planting and mechanised harvesting.

Faserinstitut Bremen's Dr Axel Drieling, presenting on cotton fibre quality for trading, highlighted key parameters, including staple length, colour grade, leaf grade, micronaire, strength, and more, assessed through instrument testing. Cotton quality extends beyond trading, considering consumer preferences like comfort, durability, and aesthetics. Throughout the value chain, from breeding to textile manufacturing, various factors influence cotton quality. These encompass environmental challenges, harvesting methods, ginning efficiency, and spinning technologies. Notably, as new spinning methods like air-jet spinning gain prominence, the demand for specific cotton properties — particularly length — increases. To meet these evolving demands and ensure fair compensation for quality, stakeholders must collaborate and harmonise measurement standards. In summary, cotton quality is a multifaceted aspect of the cotton industry, with diverse parameters impacting its assessment, and it plays a critical role in meeting consumer expectations and economic sustainability.

The session ended at 10:00

Summary Paragraph

Access to genetic diversity is crucial for cotton farming success, more so than physical seed quantities. To facilitate germplasm exchange and promote cotton breeding, long-

term financial support, storage guidelines, and multinational collaboration are essential. Precision breeding is critical to developing cotton varieties with specific traits. This approach enables better phenotyping, larger breeding pipelines, and improved prediction models. Throughout the value chain, from breeding to textile manufacturing, various factors influence cotton quality. Quality is a multifaceted aspect of the cotton industry, with diverse parameters impacting its assessment, and it plays a critical role in meeting consumer expectations and economic sustainability.