



ICAC 77th Plenary Meeting

Abidjan, Côte d'Ivoire 2 - 6 December 2018

Working Paper 2

Proposed Topics for the
2019 Technical Seminar





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Proposals from the Secretariat to the Committee on Cotton Production Research

International Cotton Advisory Committee

Abidjan, Côte d'Ivoire

December 2018

The following topics are proposed for the 2019 Technical Seminar:

1. International Seed Exchange
2. Cotton Traceability Technologies
3. Recent Advances in Cotton Biotechnology

International Seed Exchange

The cotton genetic base in many countries is narrow, and access to new seeds or germplasm holds the key for genetic improvement and progress. Such new germplasm could be available generally across continents and can assist in enhancing genetic diversity and expanding genetic variability for useful traits. Recently a few global treaties and national policies have been drafted with intentions of facilitating germplasm sharing, protecting native bio-diversity, food security, farming community rights and breeder rights. The policies developed through the 'Convention on Biological Diversity-1993', the 'International Treaty on Plant genetic resources for Food and Agriculture (ITPGRFA)-2004', and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits -2014' established clear guidelines for germplasm exchange and use between signatory countries. However, some countries have opted to draft their own national policies, which could be in broad consonance with the global policies but are strongly restrictive in stipulating conditions for seed transfers and benefit sharing. There is emerging evidence that some aspects of these policies could slow germplasm exchange across countries, which could be detrimental to the progress of cotton improvement. The seminar will discuss the implications of national policies on gene-banks and biodiversity of major cotton growing countries on the possible frictions and the emerging uncertainty of trans-boundary seed movement exchange with an objective to developing a roadmap to create a global platform that operates as a smooth and trustworthy channel of seed exchanges amongst countries across boundaries.

Cotton Traceability Technologies

Traceability methods are expected to establish authenticity of fiber quality, establish fiber origins, quantify fiber purity and track the processing path from fiber to fabric. Origins of a fiber

could be related to the place of cultivation, or a type of farming method such as organic or sustainability related practices, or a particular fiber quality such 'Egyptian cotton', or a specific species or a variety. While a few methods can trace origins and enable quantification of the fibres in a blend, others add labels to fibres and claim authentic tracking of the label along the value chain all the way to the apparel. Currently traceability methods employ either 'elemental-relative-isotope technology' to detect origins or tagging fibres with DNA or fluorescent probes or block-chain technologies to track the labelled fibres. New methods related to characterizing of microbiome signatures or DNA-nanotechnology or phosphorescent probes have also been proposed for tracking the journey of fibres in the value chain. The seminar will discuss the state-of-art cotton traceability-technologies that are available to ascertain the integrity of claims in a cost-effective manner.

Recent Advances in Cotton Biotechnology

The newly discovered genomic editing and gene-silencing tools may revolutionize health and agriculture. Over the past 20 years, insect resistant and herbicide tolerant biotech cotton have delivered impressive benefits to major cotton growing countries across the world. New exciting tools of gene silencing through Ribonucleic Acid Interference (RNAi) and genome editing through Mega-Nucleases (MN), Zinc Finger Nucleases (ZFN), Transcription Activator-Like Effector Nucleases (TALENs) and Clustered Regularly Interspersed Short Palindromic Repeats (CRISPR) along with CRISPR associated protein-9 (CAS-9) have added radically new dimensions to the prospects of biotechnological applications in cotton improvement. Genome editing, RNAi and genetic engineering can be used to develop new varieties resistant for sustainable control of bollworms, boll weevils, sap-sucking insects, cotton leaf curl virus disease, wilts and bacterial blight while adding new traits for nitrogen use efficiency, drought-tolerance, water use efficiency, climate resilience and premium fiber qualities. Trans-gene pyramiding at a single desired locus through the recently developed CRISPR-CAS9 technology by genome edited locus-specific site directed integration will immensely accelerate introgression of the multiple traits into native varieties of new biotech cotton. The seminar will discuss ways to effectively utilize these next-generation tools of cotton-biotechnology to either add novel genes at a precise locus on the genome or effectively knock-out undesirable genes. The seminar will take stock of the recent advances that have potential to revolutionize the cotton sector.