



# 74<sup>th</sup> Plenary Meeting of the INTERNATIONAL COTTON ADVISORY COMMITTEE

## MINUTES EIGHTH OPEN SESSION International Exchange of Cotton Germplasm

11:00 hr. Thursday, December 10, 2015  
Dr. K.C. Bansal in the Chair

- “Conservation of Cotton Germplasm & International Exchange: An Indian Scenario” Dr. R.R. Hanchinal (Chairman, Protection of Plant Varieties and Farmers’ Rights Authority, India)
- “World Cotton Germplasm Resources: its Utilization in Cotton Improvement” Dr. Ibrokhim Abdurakhmonov (Uzbekistan)
- “Valorization of Cotton Germplasm Collections, Securing and Developing Exchanges in Compliance with International Agreements” Dr. Bruno Bachelier (CIRAD, France)

The CHAIR introduced Dr. Hanchinal, Chairman of Protection of Plant Varieties and Farmers’ Rights Authority, India, to present a report on Conservation of Cotton Germplasm & International Exchange: An Indian Scenario.

Dr. Hanchinal reported that Green Revolution became possible due to the exchange of Plant Genetic Resources (PGR). Green Revolution meant national self-sufficiency in food, food security and improved economy. It was enabled by international exchange of germplasm, and high-yielding varieties are the result of hybridizing varieties from different countries. Classification of PGR includes primitive ancient forms, improved cultivars, wild weedy and useful species and species with potential use. Two of the allotetraploid species, *hirsutum* and *barbadense* were independently domesticated about 4,000 years ago. There are eight major cotton germplasm collections in the world, the largest of which is located in Uzbekistan. India is the ancient home of the cultivated Asiatic species *gossypium arboreum* and several of the *hirsutum* and *barbadense* genotypes were introduced by the British East India Company. The Indian genebank contains 11,168 species. Private breeders and farmers are very active in India in breeding new varieties. Global collaboration on conservation and utilization of PGR are very important, as are the free exchange of germplasm and information technology. Major concerns about PGR include improvements in exploration and exchange, conservation and regeneration, characterization and data collection, data storage and accessibility. It is necessary to promote, conserve and protect PGR. A number of international treaties regulate germplasm exchange, to make sure that germplasm is exchanged legally and not misused. An appropriate material transfer agreement must be used for every transfer of germplasm. Public sector programs should take the lead in genetic enhancement of germplasm, which should be available to private sector.

The CHAIR introduced Dr. Ibrokhim Abdurakhmonov, Center of Genomics and Bioinformatics, Uzbekistan, to present a report on world cotton germplasm.

Dr. Abdurakhmonov described world cotton germplasm resources and collections totaling 53,665 species, including 16,260 in Uzbekistan. Over 80% of the total is accounted for by upland cotton and the rest by ELS cotton. Major challenges in cotton germplasm resources include redundancy within and among collections, maintenance and storage, seed renewal periods, characterization, evaluation, systematization, cataloguing and databasing, as well as sharing, enrichment and exchange. Exchange is easier within a country, while there are many roadblocks in the exchange between countries. It is important to use molecular markers, genotyping by sequencing methods and marker-assisted selection approaches. There is a huge cotton germplasm collection in 5 institutes in Uzbekistan and over 1,300 germplasms were exchanged with the USDA. He described gene-pyramiding efforts with marker-assisted selection for fiber quality, as well as cotton transgenomics. A collaborative effort between USDA/USA and Uzbekistan enabled the transfer of BT RNAi seeds from Uzbekistan to USA. Evaluation and exchange of germplasm are important, as well as continued enrichment of collections, application of germplasms for cotton improvement, sharing of knowledge and wider international collaboration, faster

adoption of new technologies and more training. It is necessary to evaluate core sets of cotton germplasm using DNA technologies for molecular diversity assessment, to establish international consortium of sequencing “1002” cotton genotypes, including “priority” samples from each country, to apply “personalized” approach to cotton breeding/farming (i.e., chemical genomics).

The CHAIR introduced Dr. Bruno Bachelier, of CIRAD, France to present a report on Valorization of Cotton Germplasm Collections, Securing and Developing Exchange.

Dr. Bachelier described regulatory context for transfer of cotton genetic resources starting with 1961, when UPOV was created and then in 1992 the Convention on Biological Diversity (CBD) was signed by 195 states and the European Union. Two supplementary protocols were later signed, the Cartagena Biosafety Protocol (2000) and in the Nagoya Protocol on Access to Genetic Resources (2010). Another very important international treaty, the International Treaty on Plant Genetic Resources for Food and Agriculture was adopted in 2001. 69 countries ratified the Nagoya Protocol and 39 countries implemented legislative measures. The important regulations arising from the treaties are that agreements between parties exchanging genetic resources are under the control of national regulations, and there is an obligation to share the benefits resulting from the use of these genetic resources, including the associated traditional knowledge. The natural germplasm resources of cotton are extensive, dispersed globally across five continents, but are not present in all cotton-producing countries. Some germplasms of diploid species have been used as sources of useful genes. There is a complex status of cotton germplasm and genetic resources. There are cultivated and wild species. Natural populations and traditional varieties, or landraces could be the most useful gene reserves, while some of these germplasm resources could be considered at high risk. Very useful donor germplasms have been identified for many traits, including resistance to abiotic stress, such as drought, as well as biotic stresses, and even fiber quality has found contributors in the wild germplasm. To enhance the use of genetic resources in varietal improvement new genes are needed, but difficulties in obtaining them include costs and complexity of access to germplasms. There is a need to associate small countries to research projects. We need to make sure that natural population of cotton plants and traditional varieties are characterized and collected for gene banks, while financial returns to collections are of utmost importance. It is necessary to work collectively on the definitions of common plant descriptors for use in cotton collections, including evaluation of useful traits. There is also a need for agreements on common sets of DNA markers in order to genotype systematically the collections. Germplasm databases will help to associate specific DNA data with traits of interest, while a worldwide linkage of databases would permit more efficiency. He described CIRAD and its activities.

The delegate of UGANDA asked Dr. Hanchinal how farmers in India were able to become owners of several varieties bred by them. Dr. Hanchinal said Indian farmers are unique and cultivated and maintained some varieties for a very long time. Farmer communities are actively encouraged to register varieties that they have developed and maintained.

The delegate of AUSTRALIA thanked the speakers and noted that the existing international arrangements which govern plant variety rights and the growth in global seed companies servicing the cotton sector. Collaboration in the development of cotton varieties is a matter for negotiation between commercial and public research organizations. The most important limiting factor to the increase of world yields is crop management, rather than the available germplasm.

A delegate of INDIA noted that man-made fibers are in major competition with cotton, which is losing market share. What can be done to increase cotton fiber strength and improve cotton position in this competition for market share? Dr. Abdurakhmonov said that this is not an easy task since fiber strength is correlated with yield and maturity and more analyses on a molecular level are needed. It is possible that biotechnology will allow the achievement of longer and stronger cotton fibers. Dr. Hanchinal confirmed that researchers in India conduct similar analyses.

A delegate of EGYPT asked if there is an international agreement on chromosome mapping exchange to assist international breeders. Dr. Abdurakhmonov replied that there is no international agreement on the issue of genomic mapping, however researches work in collaboration under research association umbrellas and exchange information.

The CHAIR thanked the speakers for excellent presentations and summarized major observations made by them.

He urged participants to use all the recourses and tools available, improve data exchange and germplasm management.

The Chair adjourned the session at 12:40 p.m.