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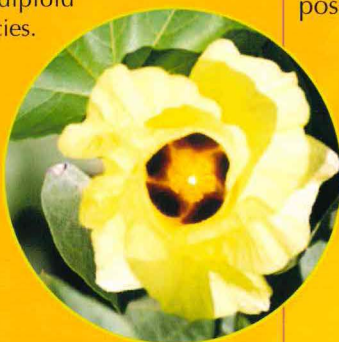


Cotton genetic resources at Cirad

The French Cotton Germplasm Collection—one of the largest in the world—is managed by CIRAD in Montpellier. It currently contains over 3 000 cotton accessions from around 100 countries. These valuable genetic resources can be tapped by breeding and genetic research programmes implementing conventional breeding techniques, interspecific hybridization and marker-assisted selection.

Gossypium genus

Cotton belongs to the *Gossypium* genus, Malvaceae family. This genus consists of 50 classified species, with 45 diploid and 5 tetraploid species. The *Gossypium* genus includes four cultivated species with seeds that produce a fibre which is long enough to be ginned: two diploid species (*G. herbaceum* and *G. arboreum*) and two tetraploid species (*G. hirsutum* and *G. barbadense*). The CIRAD collection contains five tetraploid species and 27 diploid species.



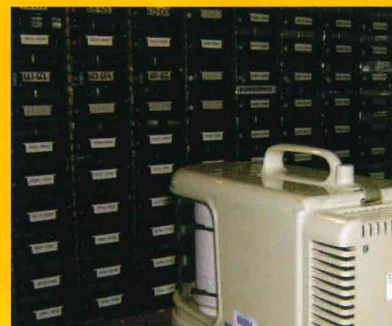
Gossypium barbadense
cotton flower.
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CIRAD Cotton Germplasm Collection

This collection contains accessions of wild and cultivated species that were collected in their centres of origin and diversification areas, lines exchanged between breeders, obsolete and modern cultivated varieties, mutants and progeny of interspecific crosses. *Gossypium hirsutum*, which is the most widely cultivated cotton species in the world, accounts for 70% of the accessions maintained in the collection.

Cotton seeds are kept in a cold room at 4°C, and thus maintain their germinative capacity for 15 years. CIRAD is also developing a procedure for cold storage at -18°C, so it will be possible to keep the seeds for several decades without damage.

Each accession is “rejuvenated” every 12-15 years by seed sowing and selfing. This rejuvenation process provides an opportunity to conduct or supplement the accession assessments. Seed propagation is carried out under partnerships in different tropical regions.



Cold-room storage of cotton seeds.
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Genetic variability resources



Normal bracts (left) and
atrophied bracts (right).
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This collection contains genetic variability that is used by breeders in their cultivated cotton breeding programmes. Genetic variability is high in the *Gossypium* genus, which CIRAD is striving to preserve, utilize and describe. Indeed, there is extremely wide variability in the size, habit, leaf and bract shape, growth rate, technological fibre traits, etc. Breeders have also focused on a wide range of traits.

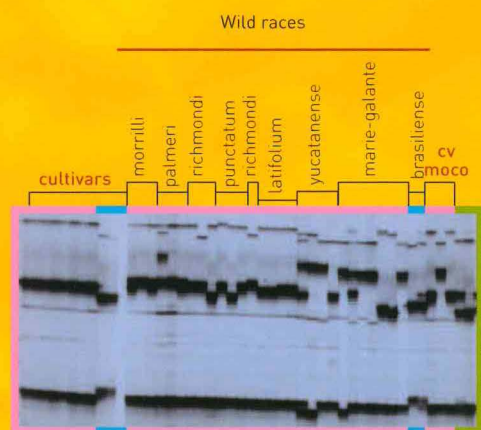
For instance, the fibre of cultivated varieties is usually white, but some cotton varieties produce coloured fibre (brown or green) which is used to manufacture naturally coloured cloth.

Naturally coloured fibre.
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Molecular markers—diversity analysis tools

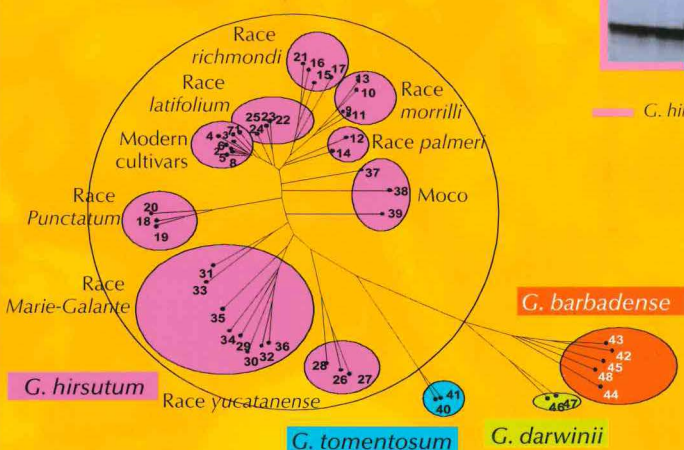
DNA molecular markers are very helpful for gaining insight into the genetic diversity in the collection and for boosting the efficacy of cotton breeding. These markers are distributed along chromosomes in patterns that generate an image, i.e. a chromosome map. Through the natural mutation phenomenon, each marker presents an array of different allelic forms, and this variability is especially

high when the accessions compared are old or genetically remote from each other. Molecular markers are being used to quantify the extent of relatedness between species in the CIRAD collection. Geneticists can thus use this tool to streamline management of the collection, i.e. enhance breeding efficacy and discard redundant types.



— *G. hirsutum* — *G. barbadense* — *G. darwinii*

Electrophoretogram on acrylamide gel of the microsatellite allelic diversity (three markers) in a collection of 46 tetraploid accessions from CIRAD's gene library.
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Tree diagram illustrating tetraploid cotton species in the CIRAD germplasm collection that were obtained by molecular marker techniques. Each number represents an accession in the collection, with different colours for different species.

For further information

Dessauw D., Nguyen T.B., Lacape J.M., Hau B., 2004. Cotton genetic resources at CIRAD. ICGI 2004 Workshop, Hyderabad, India, 10-13 October 2004.

Hau B., Lançon J., Dessauw D., 1997. Les cotonniers. In Charrier A., Jacquot M., Hamon S., Nicolas D. (ed.) L'amélioration des plantes tropicales. Montpellier, France. Collection Repères, CIRAD-ORSTOM, p. 241-265.

Lacape J.M., Rajab M., Dessauw D., Hau B., 2004. Microsatellite allelic diversity within tetraploid *Gossypium* germplasm. ICGI 2004 Workshop, Hyderabad, India, 10-13 October 2004.

Partners

Africa: IRAD, Institut de la recherche agricole pour le développement, Cameroon
• INRAB, Institut national de recherche agronomique, Benin

South Africa: PIEA, Programa de Investigación y Experimentación Algodonera, Paraguay
• EMBRAPA, Empresa Brasileira de Pesquisa Agropecuária, Brazil

USA: A&M University, College Station, Texas

Europe: Faculté des Sciences Agronomiques de Gembloux, Belgium
• IRU Polymorphisms of Interest in Agriculture (PIA), Montpellier; Groupe Dagrís, France



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