ISSCT Molecular Biology Section Webinar

by

Chair ISSCT Molecular Biology Section
Dr. John Jaime Riascos Arcos
CENICAÑA, Colombia

The ISSCT Molecular Biology Section organized the webinar with as theme: *Molecular and Biotechnology Approaches Shaping the Future of Sugarcane* on 25 June 2026 as part of the Society's ongoing webinar series, which promote scientific exchange across the international sugar cane research community. This event brought together 35 participants from 17 countries and featured presentations illustrating how molecular and biotechnological approaches are being applied to address challenges across the sugar cane improvement pipeline.

The webinar, chaired by Dr. John Riascos (CENICAÑA, Colombia) featured three speakers representing complementary areas of research. Dr. Sandy Snyman (SASRI, South Africa) presented advances in biotechnology supporting sugar cane improvement, including tissue culture, germplasm conservation, mutation breeding, and genetic transformation. Dr. Jordan Dijoux (eRcane, Réunion Island) discussed recent discoveries on the genetic basis of orange rust resistance using genome-wide association analysis and genomic prediction. Dr. Brennan Hayden (CTC Genomics, Brazil) highlighted the development of biotechnology platforms supporting the commercialization of transgenic sugar cane cultivars and future trait deployment.

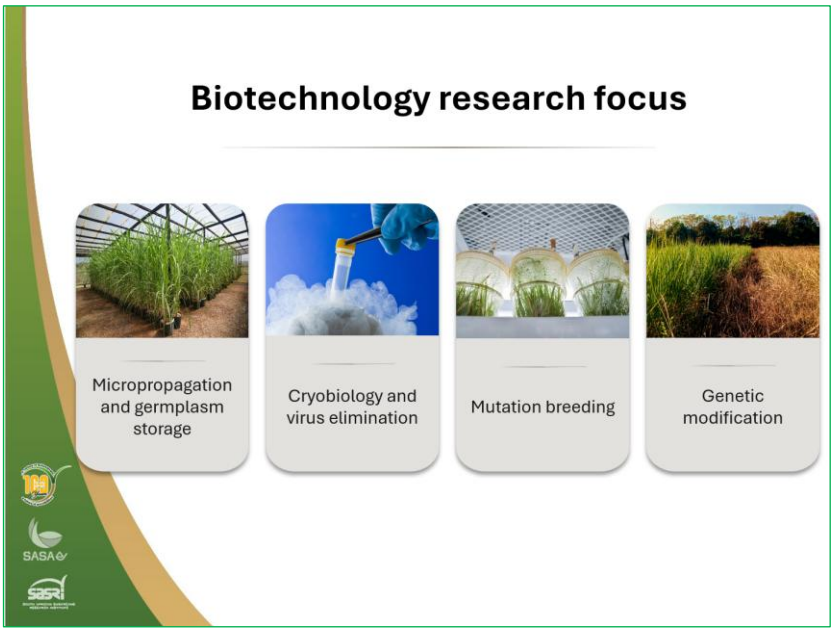
The webinar was opened by Dr. Jean-Claude Autrey, Secretary General ISSCT, and highlighted the continued success of the Society's webinar series as a platform for international scientific exchange. He also encouraged participants to submit abstracts for the forthcoming Joint Germplasm & Breeding and Molecular Biology Workshops to be held in Barbados, in November 2026.

Following the opening remarks, Dr. John Riascos invited each speaker to deliver their presentation, which was followed by a Q&A session.

Dr. Sandy Snyman (SASRI, South Africa) presented an overview of biotechnology applications that support sugar cane improvement, demonstrating how these technologies have become integral components of modern breeding programmes. She highlighted the role of tissue culture, germplasm conservation, pathogen elimination, mutation breeding, and genetic transformation in improving breeding efficiency and in maintaining healthy planting material.

A key component was NovaCane®, SASRI's commercial micropropagation system, which produces approximately 350,000 disease-free *in vitro* plants annually for South African seed cane programme.

Dr. Snyman also described advances in cryotherapy and osmotherapy for virus elimination, mutation breeding to generate novel genetic variation, and the development of transgenic sugar cane for herbicide tolerance and insect resistance traits.

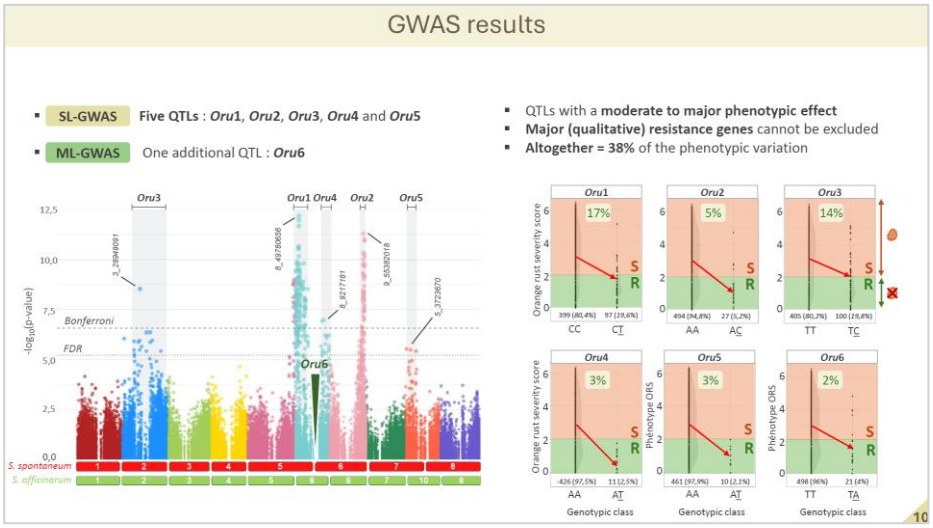


Overview of SASRI's biotechnology platform illustrating the integration of tissue culture, pathogen elimination, mutation breeding, cryopreservation, and genetic transformation within the sugar cane breeding programme

Dr. Jordan Dijoux (eRcane, Réunion Island) presented recent advances in understanding the genetic basis of orange rust caused by *Puccinia kuehnii*, resistance in sugar cane through the integration of genome-wide association

studies (GWAS) and genomic prediction. Orange rust, remains one of the major diseases affecting sugar cane production worldwide, making the identification of durable resistance an important objective for breeding programmes.

Using a breeding population of 568 genotypes phenotyped under natural disease pressure across three experimental sites, the study identified six genomic regions associated with orange rust resistance. The research also demonstrated genomic prediction of approximately **0.65**, highlighting the potential of genomic information to support early-stage selection when phenotypic evaluations are limited. Future work will focus on validating these genomic regions, developing KASP markers for routine marker-assisted selection, and broadening resistance sources through additional *Saccharum spontaneum* accessions.



Genome-wide association analysis identifying six genomic regions (ORU1–ORU6) associated with orange rust resistance in sugar cane

Dr. Brennan Hayden (CTC Genomics, Brazil) presented CTC's current biotechnology programme and its contribution to the development of next-generation sugar cane cultivars, with long-term objective of doubling sugar cane productivity by 2040 through the integration of conventional breeding with advanced biotechnology platforms.

The presentation outlined the evolution of CTC's transgenic technologies from first generation insect-resistant cultivars to VerdPro2, its second-generation biotechnology platform, which combines insect resistance with herbicide tolerance within a single commercial product. He also highlighted

advances in transformation technologies, vector design and molecular characterization supported by rigorous laboratory, glasshouse and field evaluations to ensure product performance and regulatory compliance.

Looking ahead, Dr. Hayden described ongoing efforts to develop a third generation of biotechnology products incorporating additional agronomic traits, including resistance to other insect pests such as sugar cane weevils. These advances are expected to further expand the range of commercially valuable traits available to growers.



Pests and Physiological traits as new targets for of CTC's biotechnology platform

The webinar concluded with a lively panel discussion, involving all three speakers and moderated by John Riascos, providing an opportunity to explore broader issues surrounding the adoption of biotechnology and the future role of molecular tools in sugar cane breeding.

Two important topics discussed were how research organisations can facilitate the adoption of new technologies within breeding programmes and the molecular technologies expected to have greater impact on sugar cane breeding over the coming decade.

Finally, on behalf of the ISSCT Molecular Biology Section, Chair Dr. John Riascos expressed his sincere appreciation to the speakers for sharing their expertise and recent advances in molecular biology and biotechnology for

sugar cane improvement. He also thanked all webinar participants for their enthusiastic participation, thoughtful questions, and lively discussions, which contributed significantly to the success of the event. On behalf of ISSCT, Dr. Jean Claude Autrey also conveyed his appreciation to the speakers, participants, and organizers for their valuable contributions and for making the webinar a great success.