

Advancing Molecular Characterization of Clonal, Legume, and Cereal Crops: CGIAR Genebank Accelerator

Objective: Deliver a conceptual foundation in molecular characterization, cryopreservation, bioinformatics, and data sharing for Clonal, Legume, and Cereal crops, preparing participants for a hands-on course and fostering a Community of Practice. The agenda addresses survey findings (e.g., crop priorities, 37.9% lack DNA extraction capacity, 69.0% bioinformatics skills gap) and ensures accessibility for participants from Europe, Africa, Latin America, and beyond.

Schedule: Monday, Tuesday, Wednesday, and Friday, 12:00–13:30 WAT (1.5 hours per session), aligning with 13:00 CEST (Europe), 08:00 BRT (Latin America), and 17:30 IST (Asia).
Target Audience: Genebank professionals from National (41.4%), Regional (24.1%), University (17.2%), and International (13.8%) institutions, with diverse capacities (e.g., 62.1% have DNA extraction capacity) and crop focuses (Cereal, Clonal, Legume).

Week 1: Molecular Characterization Foundations (1-5 Sept)

Objective: Introduce participants, establish collaboration, and cover core molecular characterization concepts for Clonal, Legume, and Cereal crops.

Day	Time (WAT)	Activity	Topic	Facilitator	Objectives/Description	Comments
Monday	11:45 - 12:00	Introduction to the Webinar		All facilitators	Agenda, objectives and timeframe of webinar Icebreaker: Participants share their institution, crop focus, and a key challenge (e.g., cost, expertise). Fosters a Community of Practice.	
	12:00–12:15	Participant introductions	Socialization and Molecular Biology	Marie-Noelle Ndjiondjop/Vania Azevedo	Introduction to the basic structure of nucleic acids (DNA/RNA) and molecular tools, with emphasis on their role in analyzing genetic diversity	
	12:15–12:45	Molecular biology overview	Exploring Molecular Applications for Regional Priorities	Monica Carvajal		
	12:45–13:15	Genotyping and sequencing platforms	Overview of different genotyping and sequencing platforms and the concept of DSI	Carolina Sansaloni	Genotyping and sequencing platforms	
	13:15–13:30	Q&A			Brief Q&A to clarify concepts. Concrete applications in germplasm collections; essential biochemical concepts of nucleic acids extraction; factors affecting DNA quality. Sample preparation techniques including tissue selection (e.g., leaves, roots, seeds), preservation methods (e.g., silica gel, freezing), grinding techniques and their impact on DNA extraction.	
Tuesday	12:00-12:30	Introduction to DNA extraction	Sample Preparation for Genetic Characterization	Juan Soto/Ronald Robles/Veronica		
	12:30-13:00	DNA extraction protocols	DNA extraction	Ronald Robles/Veronica Valencia	General overview of DNA extraction protocols (e.g., CTAB, commercial kits) for genebank crops, Advantages-disadvantages; optimization for polysaccharides, mucilage, etc., Workflow of techniques. addressing the 37.9% capacity gap	
	13:00–13:15	Q&A		Marie-Noelle Ndjiondjop/Carolina Sansaloni	Short Q&A with a poll on sample preparation challenges	
Wednesday	12:00–12:30	Qualiy and shipping and Final Guidelines	DNA extraction	Ronald Robes/Veronica Valenica	DNA Quality Assessment and Troubleshooting; quantification methods (Nanodrop, gel electrophoresis) and requirements by genotyping platforms. Common problems and best practices in collection, transport, conservation...	
	12:30–13:00	Ploidy analysis		Bettina Heider/Julie Sardos	Introduction to ploidy analysis (e.g., flow cytometry) for Soybean and Yam, where 31.0% lack knowledge. Includes a 5-min video demo.	
	13:00 - 13:30	PCR and the genetics of PCR		Ranjana Battacharjee		
	13:30 - 14:00	Q&A		All facilitators		
Thursday	11:00 - 12:00	Different platforms and data generation	Applications and outputs	Carolina Sansaloni		
	12:00–12:30	Data analysis, genetic diversity analysis, population structure (cereals)	Data cleaning and analysis	Zakaria Kehel/Carolina Sansaloni		
	12:30–13:00		Regional perspectives	Zakaria Kehel/Carolina Sansaloni/Kuldeep Singh		
	13:00–13:15	Subsetting, gap analysis based on molecular diversity analysis		Zakaria Kehel		
	12:00–12:30	Conserving genetic structure of collections	Applications of Genomics in determining population size for germplasm regeration	Kuldeep Singh	infused by farmers. The main focus of genebank curator is to maintain the genetic integrity and diversity within accessions while regeneration. This lecture provides participants with a basic understanding of diversity within and among accessions,and sample size required during regeneration to maintain the population structure of the collections.	
Friday	12:30–13:00	Generating of diversity subsets	Use of DNA markers for diversity and genetic structure analysis	Vetriverthan Mani & Demaris Odeny	The lecture briefs about the use of molecular markers and analytical tools for diversity analysis in the collection and development of diversity subsets	
	13:00–13:15	Q & A				

Week 2: Cryopreservation and Advanced Molecular Characterization (8-12 Sept)

Objective: Deepen understanding of molecular characterization with genotyping platforms and reference genomes, and introduce cryopreservation techniques.

Day	Time (WAT)	Activity	Topic	Facilitator	Objectives/Description	Comments
Monday	12:00–12:30	Introduction on cryopreservation		Bart Panis / Rainer Vollmer	Cryopreservation of Plant Genetic Resources – Advantages, Challenges, and Future Outlook	
	12:30–13:00	Cryopreservation for Clonal crops		Bart Panis / Rainer Vollmer	Cryopreservation of clonal crops at the CGIAR genebanks and the National Systems.	
Tuesday	13:00–13:15	Q&A			Short Q&A with a poll on genotyping platform access.	
	12:00–12:30	Cryopreservation for recalcitrant seeds	Cryopreservation for Recalcitrant Seeds	Rainer Vollmer / Bart Panis	Cryopreservation of recalcitrant seeds and short-lived orthodox seeds - A new tool for seed conservation	
	12:30–13:00	Practical considerations		Rainer Vollmer / Ovais Peerzada	Discuss infrastructure and low-cost solutions for recalcitrant seed storage, with a 5-min case study on Groundnut .	
	13:00–13:15	Q&A			Brief Q&A on genome access and cryopreservation barriers.	
Wednesday	12:00–12:30	Bioinformatics Basics	Molecular Characterization for Genebanks	Cesar Petrolì	Overview of molecular characterization concepts for exploring genebank diversity (e.g., genotyping technology, molecular markers, SNP analysis) tailored to beginners . Includes a 5-min demo.	
	12:30–13:00	DSI overview	Digital Sequence Information (DSI)	Mathieu Rouard	Introduction to DSI and its role in molecular characterization. Discuss open-access databases (e.g., GenBank, Ensembl), how to extract data to analyze and use, how to best make use of open-access.	
	13:00–13:15	Q&A		Cesar Petrolì/Mathieu Rouard	Short Q&A with a poll on cryopreservation challenges.	
Thursday	12:00–13:00	DSI applications		Carolina Sansaloni	Explore DSI applications for genebanks (e.g., genetic diversity analysis, redundancy, etc.) with a 5-min demo of GenBank navigation.	
	13:00-13:15	Q&A			Brief Q&A with a poll on preferred bioinformatics tools	
Friday	12:00–12:30	DSI & Multilateral System Introduction	CBD framework, treaty framework, recent decision Why is DSI so important in this context of renegotiations?	Claudio Chiarolla/Mathieu Rouard	NARS as generators of data, wanting to make data available online as well	
	12:30–13:00	DSI & Multilater System		Ruaraidh Sackville Hamilton		
	13:00–13:15	Q&A			Short Q&A on DSI access challenges.	
	13:15 - 13:30	Closing	Course evaluation, next steps	All	What do the NARS think? Have they advanced their knowledge of DSI? Future training ideas?	