

HARNESSING THE FRUITS OF PROMISING GENOMICS-ASSISTED BREEDING FOR IMPROVEMENT OF CLONALLY PROPAGATED CROPS

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Advances in next-generation sequencing, genotyping technologies coupled with high-performance computation approaches, partnerships with advanced research institutes and availability of several service providers has paved many possibilities to apply genomics tools to advance crop-breeding programs in several model and non-model plant species. This enabled the application of 'genomics-assisted breeding' or 'whole genome selection'. Breeding for clonally propagated crops target highly diverse biotic and abiotic constraints, whilst meeting complex end-user quality preferences to improve livelihoods of beneficiaries in developing countries. Achieving breeding targets and increasing the rate of genetic gains for these crops, with long breeding cycles, and genomes with high heterozygosity and different ploidy levels, is challenging. Cheaper sequencing opens possibilities to apply genomics tools for complex traits, such as yield, climate resilience, and quality traits. However, the use of advanced DNA technologies needs to be coupled with high throughput phenotyping protocols, knowledge from other-omics approaches (e.g., gene expression via transcriptomics, protein function via proteomics, and metabolic pathways via metabolomics), and big data platform to allow the identification of molecular markers linked to complex traits, the dissection of genetic variability, identification of putative candidate genes, and their causative alleles for gene expression or gene function. Therefore, in clonally propagated crops such as yam (*Dioscorea spp.*) and cacao (*Theobroma cacao*) genomic resources and approaches, including sequenced draft genomes, SNP discovery, quantitative trait loci (QTL) mapping, genome-wide association studies (GWAS), and genomic selection (GS), are being implemented.

Biography

Ranjana Bhattacharjee has completed her PhD from Chaudhury Charan Singh Haryana Agricultural University in India with her research work conducted at the International Crops Research Institute of Semi-Arid Tropics. She received the prestigious Jawaharlal Nehru Award for the best PhD theses from the Indian Council of Agricultural Research. She did her Post-doctoral Research from the International Institute of Tropical Agriculture (IITA). She is currently a Molecular Breeder at IITA, a CGIAR (Consultative Groups of International Agricultural Research) institute based in Nigeria. She has published more than 30 papers in reputed journals and written several book chapters with reputed publishers.

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