

Plenary Lecture:

“Integrative Plant Genomics: From Botanical Discovery to Agricultural Transformation”

Speaker 2 (focusing on dicots; horticultural crops):



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Not All Mutations Are Equal: Spatial Bias, Mechanisms, And Biological Cost

Plant mutations can arise in somatic tissues, and those occurring in the shoot apical meristem (SAM) can become fixed. However, the impact of SAM layered organization has remained unclear. By analyzing long-term clonal propagation in potato, we show that mutations accumulate independently in L1 and L2/3, with higher rates in the epidermal L1 and reduced rates in germline-contributing layers, alongside strong suppression in genic regions. This pattern is supported by induced mutagenesis in peppermint, where most mutations form stable periclinal chimeras confined to specific layers, sometimes altering secondary metabolite production through single-layer haplotype loss. Mutations that do not capture the meristem instead form localized sectors. Analysis of leaf twin spots in tobacco, previously attributed to somatic recombination, reveals that these sectors predominantly arise from genome instability—including deletions, translocations, and aneuploidy—rather than homologous recombination. Together, these findings show how development and genome instability shape somatic variation.