Computational science, modeling and simulations

Moderated by
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Leveraging advances in applied mathematics, computational methods and cyber infrastructure can have a significant impact on understanding plant growth across multiple length and time scales. Modeling, data-driven approaches and directed optimization can enable understanding complex GxE interactions, help offset increased future weather variability and lead to improved traits for feeding a growing world population. We will hear perspectives from three experts on computational strategies and approaches to integrate these methods with designing plants. Our first panelist, Carolyn Lawrence (Iowa State University) will discuss novel approaches to knowledge discovery by data-mining disparate phenotype datasets. This will enable learning across multiple length, time and species hierarchies. Our second panelist, Siobhan Brady (U C Davis), will discuss the development of computational strategies to extract quantitative space-time information from root growth images in four dimensions. This phenotype trait extraction will then be used to gain insight into the exceedingly tough problem of mapping the gene regulatory network. Our third panelist, Srinivas Aluru (Georgia Tech) will then showcase and address how parallel algorithms and high performance computing can enable solving inherently intractable problems in gene network reconstruction. All three will articulate computational grand challenges that the community can work on.