in silico Crop Design: Simulate to Innovate

Dr. Graeme Hammer, Professional Research Fellow, Queensland Alliance for Agriculture and Food Innovation

Here I will consider the extent to which advances in dynamic crop growth and development models along with computational power now allow *in silico* exploration of consequences of potential agronomic and breeding interventions in **design** of improved crops for production systems. Design for enhanced crop adaptation must be responsive to genetic (G), management (M), and Environmental (E) influences. Is it now feasible to form an integrated next generation systems approach to deliver improved crop adaptation (G*M*E) by combining advances in agronomy associated with the on-farm digital environment (M*E) with advances in plant breeding associated with genotyping, phenotyping, and genomic prediction (G*E)? Does the 'simulate to innovate' systems approach generate the modelling and analytical technologies needed for this advance or is its real value in facilitating dialogue and trans-disciplinary connectivity among experts involved in the various aspects of crop improvement? Or both?