

FMfI2016 at QUT, November 21-23, 2016

Biology, Agriculture and Environment

*“Agriculture as a metaphor for creativity in all human endeavors.”*

The agricultural process of planting a seed, fertilizing, growing and harvesting has a clear parallel with the application of mathematics to a practical problem. The seed becomes the question being asked, the fertilization is the conceptualization of the mathematical framework within which to seek the answer, the growing is the solution process, and the harvesting is the articulation and implementation of the answer.

In agriculture: the breeding of the seed to plant involves genetics; the germination of the plant involves moisture alone; the growth involves the interaction between the biology and environment with soil, water and weather the key drivers; the survival depends on its ability to respond to viral and fungal infections and stress challenges; and the flowering and setting of the seed for the next generation depends on the occurrence of environmental cues.

For understanding the processes and mechanisms involved with each of these steps, mathematical modelling is central. This is reflected in the emergence of new mathematically-focused agriculture endeavours such as “precision agriculture”, “smart agriculture analytics” and “digital agriculture”.

The success of agriculture practice relies fundamentally on its interconnections with and dependence on biology and the environment. Both play fundamental roles including the adaptation of biology to cope with environmental challenges of biotic and abiotic stress and global warming.

The outputs from agriculture sustain human survival while that from the application and development of mathematics support the knowledge and expertise of the sciences on which successful agricultural practice depends and exploits. The talks will explore the contribution of mathematics within the framework of the interaction of agriculture with biology and the environment.