NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

SEMINAR

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Hosted by Assoc Prof Lau On Sun

Deciphering the SUMO code in plants

By **Ari Sadanandom**

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About the Speaker

Ari Sadanandom is a Professor in the Department of Biosciences at the University of Durham, UK. Ari Sadanandom is also director of the Durham Centre for Crop Improvement technology, a multi-disciplinary research centre that works with Agritech industry to develop technology that is effective in field conditions. Ari Sadanandom has pioneered the area of (Small Ubiquitin-like Modifier), SUMO protein modification in plants. His research group has demonstrated that SUMOylation coordinates growth control with changing environmental conditions by directly modifying the activity of major transcriptional regulators in plants. The current focus of his research group is to understand how protein modifications influence plant responses to invading pathogens. Ari is also a co-founding member of the Plant Proteostasis community and the UK rice research network.

Post-translational modification (PTM) events generate proteoforms that orchestrate cell signalling in almost every biological process. The SUMOcode project aims to understand a critically important but understudied PTM in plants, SUMO (Small Ubiquitin-like Modifier). The rules governing specificity and function remain rudimentary for most PTMs, but the plant SUMO system provides a unique possibility to unravel the rules governing SUMOylation, as its core machinery comprises only 33 genes in Arabidopsis, compared with many hundreds for other PTMs.

Our central hypothesis is that SUMO specificity is conferred through how cells are primed to respond to different stress signals, the tissue and cellular spatial distribution of SUMO machinery and substrates and control of SUMOylation modification via activation, repression and competition for PTM sites. Employing state of the art multi-omics technologies we created the first SUMO Cell Atlas of any organism.

We determine how the SUMO code remodels transcription in different cell types to trigger adaptive responses. Finally, we will translate the SUMO code across the plant kingdom and reveal natural variation in crop genomes to demonstrate the value of the SUMO code, its machinery and regulatory targets.

Our ultimate goal is to ‘enable’ researchers and breeders to decipher the SUMO code in plants, enabling them to edit and rewrite the code, to develop crops that are future proofed against ongoing climate change.