The transition from health to sickness via the chloroplast

Microbe associated molecular pattern (MAMP) receptors in plants recognize MAMPs and activate basal defences; however a complete understanding of the molecular and physiological mechanisms conferring immunity remains elusive. Pathogens suppress active defence in plants through the combined action of effector proteins. This talk presents results showing the chloroplast as a key component of early immune responses. MAMP perception triggers the rapid, large-scale suppression of nuclear encoded chloroplast-targeted genes (NECGs). Virulent Pseudomonas syringae effectors reprogramme NECG expression in Arabidopsis, target the chloroplast and inhibit photosynthetic CO2 assimilation through disruption of photosystem II. This activity prevents a chloroplastic reactive oxygen burst. These physiological changes precede bacterial multiplication and coincide with pathogen-induced abscisic acid (ABA) accumulation. MAMP pretreatment protects chloroplasts from effector manipulation, whereas application of ABA or the inhibitor of photosynthetic electron transport, DCMU, abolishes the MAMP-induced chloroplastic reactive oxygen burst, and enhances growth of a P. syringae hrpA mutant that fails to secrete effectors.