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STRESS NETWORKS

Spatial and developmental aspects of defence against pathogens

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Much is still being learnt from analysis of *Arabidopsis* about how plants balance the need to defend against pathogens with requirements for development and reproduction. We have been characterising *Arabidopsis* stress signalling networks in response to virulent (invasive) pathogens in which there is an antagonistic relationship between activation of immune responses and growth. *EDS1* (*Enhanced Disease Susceptibility1*) is an important regulator of post-invasive resistance that connects immune receptor recognition to transcriptional potentiation of basal defences and the triggering of programmed cell death. EDS1 and its signalling partners PAD4 (Phytoalexin Deficient4) and FMO1 (Flavin-Dependent Monoxygenase1) are also necessary for the induction of systemic immunity in response to local infection. In these functions, EDS1-PAD4 complexes inside leaf cells appear to exert a core activity that regulates the production of salicylic acid (SA) and other signal intermediates. FMO1 controls an SA-independent branch of the EDS1/PAD4 pathway. The activities of EDS1 and its signalling partners antagonize the jasmonic acid (JA) pathway and this may be a mechanism of fine control between different local and systemic stress signalling networks. Analysis of *Arabidopsis* EDS1/PAD4 dual over expression lines and of mutants that fail to restrict immune and cell death responses reveals that triggering of defences through the EDS1 pathway causes severe growth retardation. Evidence suggests that developmental defects are part of an intrinsic programme rather than being due to hyper responsiveness to microbes. We're using a combination of metabolite profiling of over expression or mutant lines and EDS1 protein complex biochemistry to understand how the EDS1-regulated plant defence system works and interplays with developmental and hormone pathways.