



Genetic regulation of nodulation and symbiotic nitrogen fixation in legumes

Wednesday 11 December 2013 1 – 2pm

Peter M. Gresshoff ARC Centre of Excellence for Integrative Legume Research,
The University of Queensland

Slatyer seminar room R.N. Robertson Building (Bldg. 46), Linnaeus Way, ANU



All plants regulate the number of lateral organs through sensing of environmental and internal signals. As one significant example, legumes, like soybean, regulate the number of nitrogen fixing nodules through systemic signals. Prior nodulation events (as in Autoregulation of Nodulation, AON), acid soil (low pH) and nitrate are major controls. Repeated cell divisions initiating the nodule primordium are autoregulated leading the characteristic nodulation on the upper root system. AON in all legumes functions through an ubiquitously phloem-expressed LRR receptor kinase gene (*GmNARK*, *MtSUNN*, *LjHAR1*; all Arabidopsis CLV1 related), that requires the sensing within the root of *Rhizobium*-(Nod-factor)-induced nodule primordia. Yet inoculation-related AON appear to function in leaf phloem parenchyma where *GmNARK* and interacting proteins result in long-distance blockage of further cell divisions in the rootv cortex/pericycle. Mutants in *GmNARK* supernodulate. We have discovered candidate molecules for the long distance signals moving upwards and downwards. CLE peptide genes, related to Arabidopsis CLV3, induced by rhizobia in soybean, when overexpressed in soybean roots completely suppress nodulation, in a NARK-dependent fashion. A small (<1 kDa) metabolite produced in leaf in a NARK-dependent manner if fed by a novel petiole feeding assembly, suppresses nodulation. The presentation will summarise our combined genetic, functional genomics and biochemical understanding of the nodulation-control network.

Presented by

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