

Extended Abstract

Genomics and genetics to analyze nodulation regulation of legumes

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Abstract

Legume plants, like peas, beans, medics and soybeans, have the ability to interact with prokaryotes like Bradyrhizobium and Rhizobium to develop novel root organs called 'nodules'. These house the inducing bacterium to develop a nitrogenfixing symbiosis that benefits the plant, the bacterial population and resultant agronomy/economy/environment. Genetics and coupled genomic approaches have opened our understanding of the underlying processes related to the nodule ontogeny. Recent advances have clarified further the molecular mechanisms of control of the basic steps of ontogeny.

Thus the molecular signals initiating 'Autoregulation of Nodulation (AON)', the critical receptor kinase in the leaf tissue (GmNARK in soybean) and the subsequent signaling cascades of shoot-derived inhibition have been revealed. Plant peptides, LRR receptor kinase, microRNA, cytokinin hormone and transcriptional factors are directly involved. Amazingly the revealed mechanisms appear to be common among all legumes, suggesting possibilities to improve the nitrogen-fixing potential of many crop legumes through lateral transfer of information and technology.