

Biology Seminar

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The Samuel Noble Foundation

Medicago Functional Genomics

Symbiotic nitrogen fixation (SNF) by rhizobia in legume nodules contributes as much as 50 million tons of fixed N (ammonium) to agriculture each year in an environmentally-friendly and sustainable way. This is now surpassed by the contribution of industrial nitrogen fixation which produces approximately twice this amount of fertilizer N for agriculture. Unfortunately, over-use of industrial fertilizer N is having disastrous effects on terrestrial and aquatic environments. Therefore, there is a growing need to reduce the use of industrial fertilizer. Expanding the use of SNF in agriculture is one way this could be achieved.

Genetic approaches over the past decade have uncovered a small set of plant genes that are required for nodule development and symbiotic nitrogen fixation in legumes, and genomics and functional genomics approaches have expanded greatly the numbers of genes that are likely to contribute to this process. My talk will focus on the development of tools for functional genomics in two model legumes, *Medicago truncatula* and *Lotus japonicus*, and on the use of these tools to identify novel genes involved in SNF. Amongst other things, I will describe the physiological roles of symbiotic hemoglobins in nodules, the role of a sulfate transporter in supplying S to rhizobia, and roles of a gene called HERMES in establishing symbioses with both rhizobia and arbuscular mycorrhizal fungi.