A novel nucleotide-binding domain leucine-rich repeat receptor (NLR) involved in soybean nodulation

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Legumes can exploit their relationship with nitrogen-fixing rhizobia to thrive in low nitrogen environments via the formation of symbiotic organs on their roots, termed nodules. The plant innate immune system has been shown to be a major determinant of nodule formation. For example, soybean nucleotide-binding domain leucine-rich repeat receptors (NLRs) have been shown to restrict symbiosis with certain strains of rhizobia upon recognition of specific rhizobia proteins. Here, we report the characterisation of a novel NLR of soybean which responds to Nod factors unlike previously reported NLRs. Interestingly, a promoter::*GUS* fusion revealed this gene is induced from early infection through to mature nodules. When overexpressed, the *NLR* reduces nodule number and size. When knocked-out via CRISPR genome editing, nodule diameter significantly increased but there was no change in nodule number. mRNA of the *NLR* undergoes alternative splicing to produce at least four different protein isoforms. NLRs in plant-pathogen interactions, often called *R*-genes, have recently been shown to form resistosomes capable of degrading nucleotides and facilitating cell death. Sequence analysis suggests the soybean NLR involved in nodulation has the necessary catalytic sites for this enzyme activity. New insight into this gene and our current understanding of the interplay of plant immunity in legume nodulation will be presented.