Characterization of over 37,500 genes to identify candidates involved in regulating nodulation in soybean

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Looking at thousands of genes simultaneously using a microarray
Looking at thousands of genes simultaneously: How it is done

What we Discover
- What genes are expressed in those cells
- Level of expression for each gene
We are using microarrays to help understand how legumes control the number of nodules that develop on their roots.
Legume Nodulation

Atmospheric Nitrogen

NH₃

sugar

Rhizobia
Legumes Regulate their Nodule Number for Optimal Growth and Development

Normal Nodulation on Soybean Root

Supernodulation on a Mutant Soybean Root
How Legumes Regulate Nodule Number

- GmNARK protein
- Root-Derived Signal
- Leaf-Derived Inhibitor
- Rhizobia
How Legumes Regulate Nodule Number

GmNARK protein

Root-Derived Signal

Leaf-Derived Inhibitor

Rhizobia
What are the Signals Regulating Nodule Number?

GmNARK Receptor Kinase

Root-Derived Signal

Shoot Derived Inhibitor

Rhizobia

Changes in Gene Expression?
What Other Genes in Addition to GmNARK are Involved in Regulating Nodule Number?

Root Signal → Leaf Inhibitor

Wild Type

GmNARK Mutant
Looking for Additional Genes Involved in Regulating Nodule Number

Identified at least 7 additional genes that may function to regulate nodule number in soybean