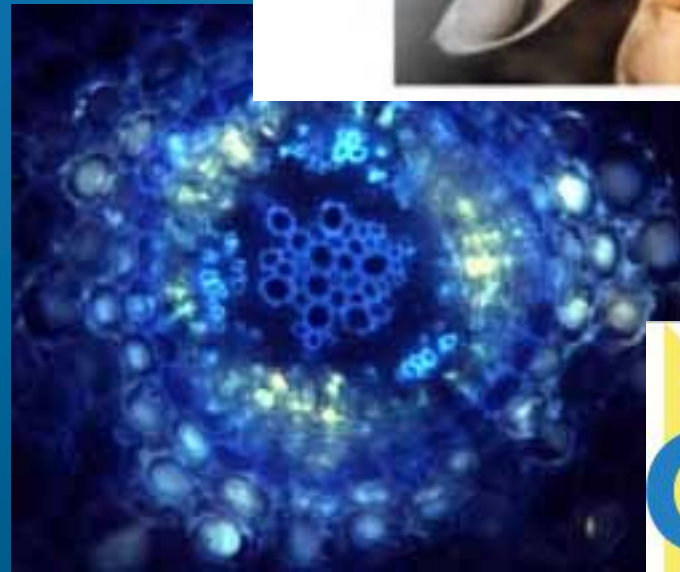


**ARC Centre of Excellence  
for Integrative Legume  
Research**

# **Nodule Number Control**



**Lisette Pregelj – Education and  
Outreach Manager**



# Nodulation Control

- Legumes actively control nodule numbers
- Control is genetic
- Ensures the plant doesn't give away too much sugar
- Tight control
- Called Autoregulation of Nodulation (AON)



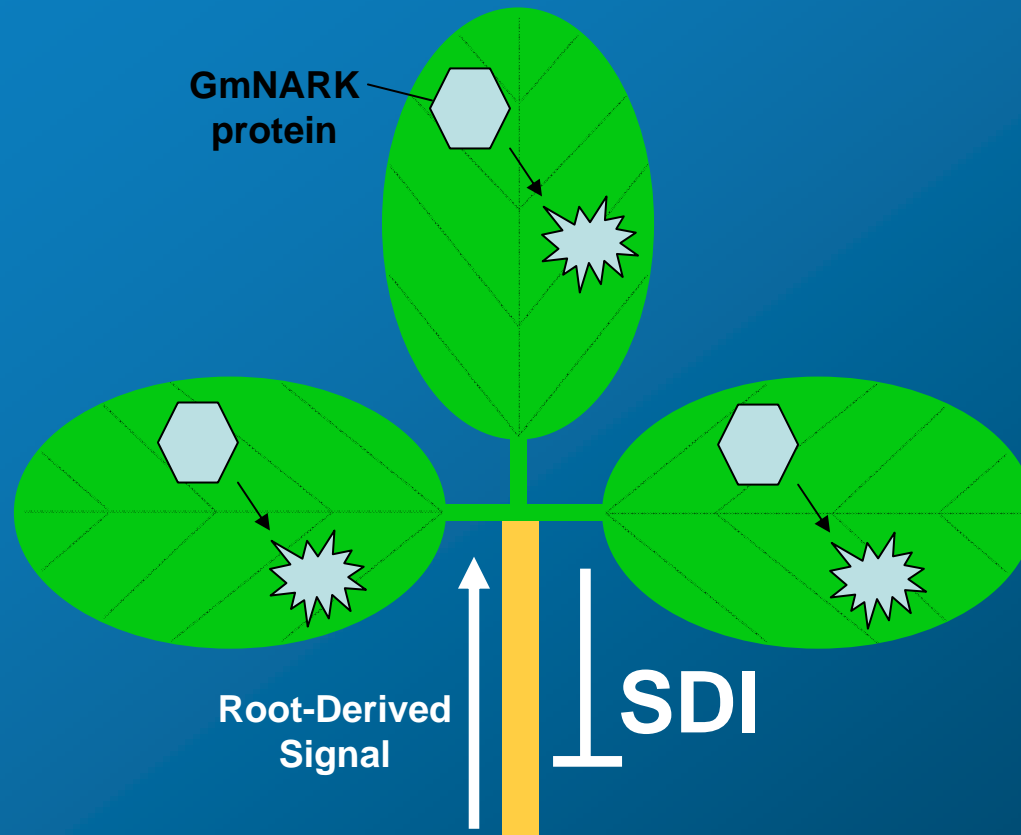
Normal

# Autoregulation of Nodulation

- Long distance signalling between root and shoot
- Once the Nod factor has bound to its receptor (Nod Factor Receptor), a signal is released and translocated to the leaf
- Another receptor in the leaf receives the signal (Nodulation Autoregulation Receptor)
- This receptor is a protein kinase and commonly referred to as NARK (Nodulation Autoregulation Receptor Kinase)

# Autoregulation of Nodulation

- **NARK receives the signal and produces a second signal**
- **We call this second signal the Shoot Derived Inhibitor (SDI)**
- **SDI moves down the plant to the roots and inhibits the formation of any new nodules**
- **Ensures nodule numbers do not get out of control to the detriment of the plant**



 Rhizobia



# Nodulation Control

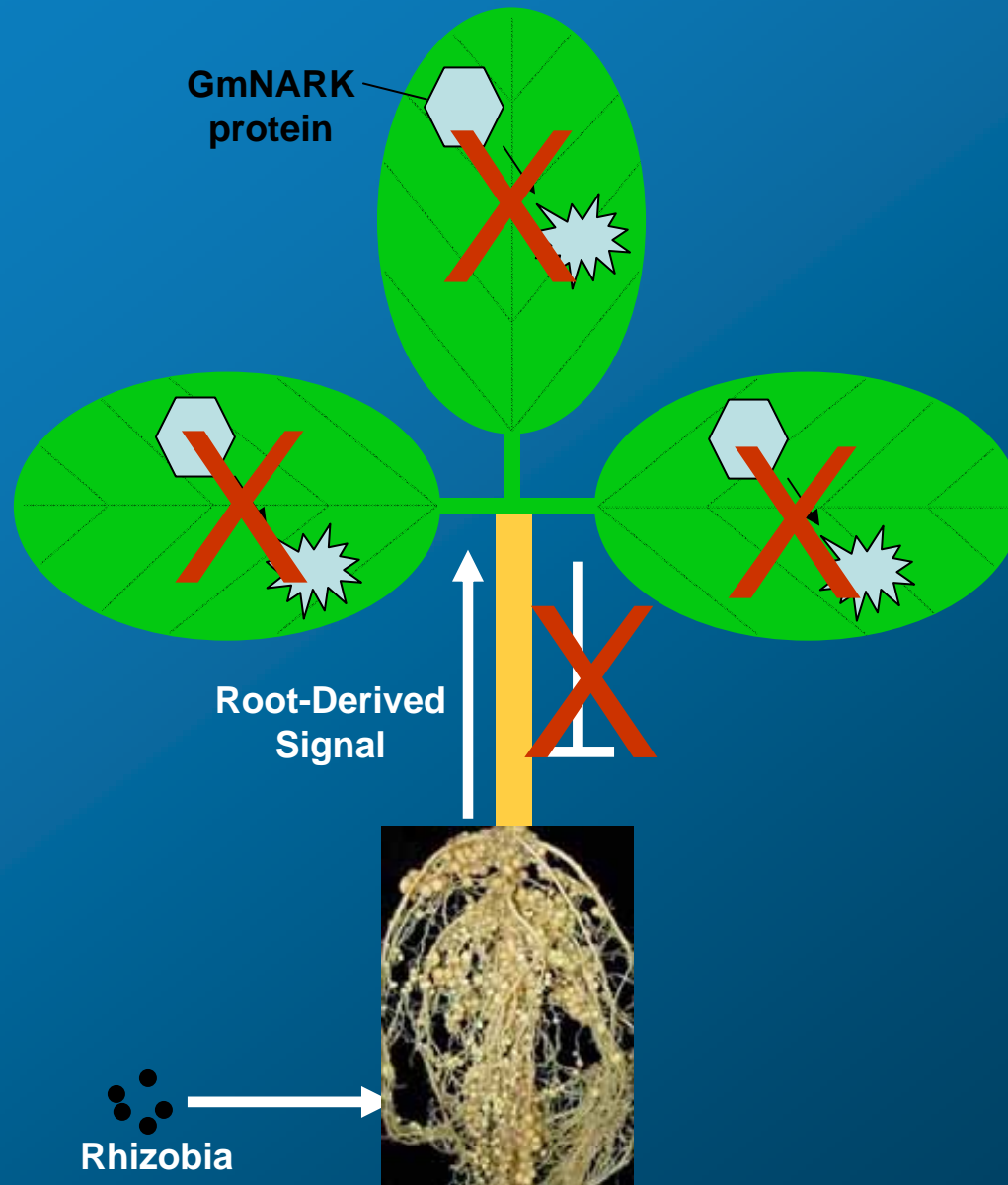
- Sometimes the genes do not work properly (mutation)
- Results in inability to control nodule numbers
- Supernodulation
- This mutant is soybean nts1007
- Has a mutation in the NARK gene



Normal

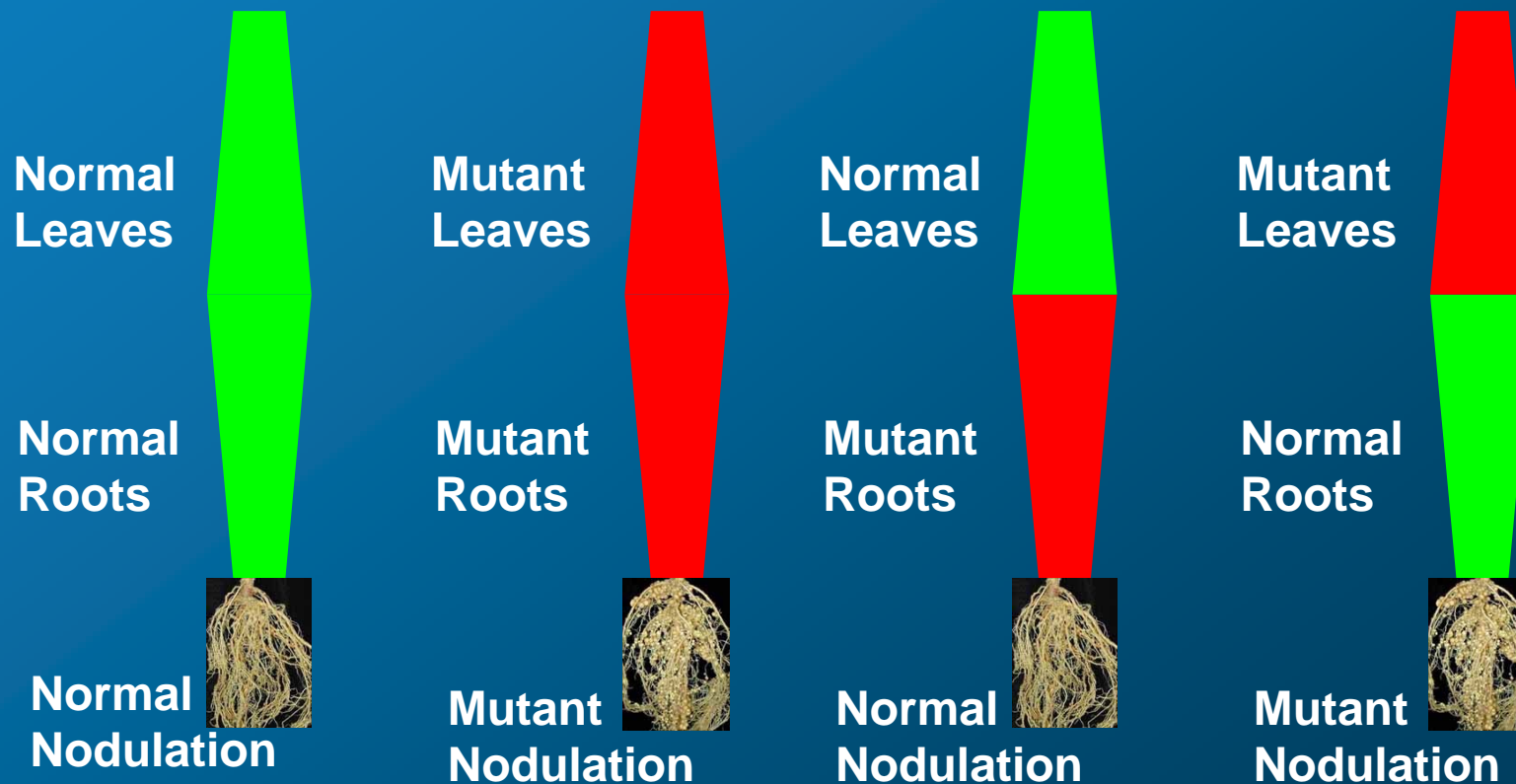


Mutant



# Leaf Control

- We know that Autoregulation of Nodulation is controlled in the leaf:

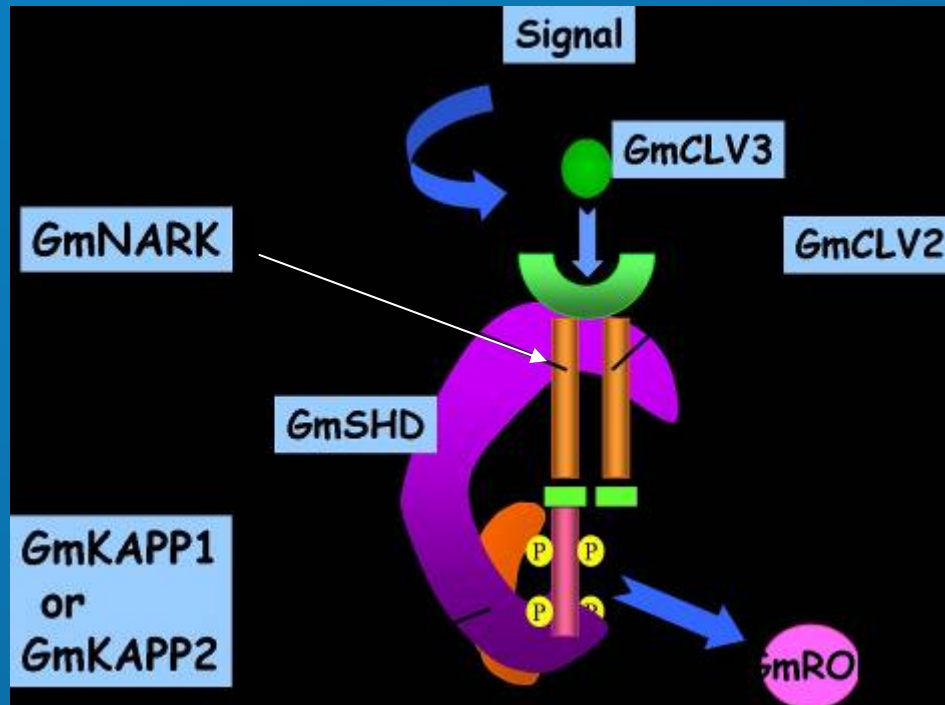




# GmNARK

- Soybean's botanical name is *Glycine max*
- Therefore its NARK gene is commonly referred to as GmNARK (*Glycine max* Nodulation Autoregulation Receptor Kinase)
- GmNARK works with a number of other genes/proteins
- GmNARK has near relatives in other legume such as Pea, Lotus and Alfalfa

# GmNARK



- Model of what we think GmNARK interacts with
- Our job here at the CILR is to discover exactly what these extra proteins are
- We are on the right track!

# CILR

- **We are currently trying to identify what the different signals are that move between legume roots and leaves**
- **When we know more, we can apply this knowledge to non-legume species**
- **Crops can then make own ammonia from nodules**
- **No need to fertilise!**
- **Less run-off pollution and environmentally safe!**

# CILR

- **University of Queensland**
- **Australian National University**
- **University of Melbourne**
- **University of Newcastle**



# CILR

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