

Fact sheet

HUNTER LOCAL LAND SERVICES

July 2020

Legume nodulation: Paddock survey

Pasture legumes

Legumes play an important part in many pastures in the Hunter. The root nodules on legumes house symbiotic nitrogen-fixing bacteria called *Rhizobia* which provide nitrogen to the plant and later to the pasture grasses and other non-leguminous pasture species.

Pasture legumes are commonly said to fix between 20-40 kg of N per ton of Dry Matter they produce. So if you have some legumes in your pastures then you would be expecting this level of Nitrogen to be provided to your pastures.

Well maybe! It all depends on the nodules. There can be very few nodules on a legume plant, or sometimes none at all. And legume appearance above ground is not a reliable indicator of nodulation below the ground, as healthy looking plants can actually have very few nodules.

Nodulation survey results

Surveys of legume nodulation were conducted in the Central West, Central Tablelands, Monaro and Riverina regions recently by Local Land Services, MLA and Monaro Farming Systems. Two hundred and twenty-five paddocks were tested and they found that around 90% of all paddocks had inadequate nodulation. In some regions up to 20% of paddocks had no nodules present on legume plants.

The results of the survey indicate that the provision of nitrogen via biological fixation may be considerably less than is commonly expected.

In seeking to explain this, Dr Belinda Hackney of Central West Local Land Services suggested that the rhizobia associated with sub clovers performs optimally where pH is above 5.5 and once it falls below pH 5 the population of rhizobia declines.

This survey found that more than 70% of paddocks sampled had a soil pH that is sub-optimal for the function of rhizobia associated with clover and medic. So, while the plants might grow well at the pH in the paddock, the rhizobia would not.

Addressing the issue of poor nodulation is likely to require amelioration of soil acidity issues and provision of soil nutrients (particularly Sulphur) essential for symbiotic nitrogen fixation.

Checking for nodules

You can check the nodulation on the legumes in your pastures.

Dr Susan Orgill of NSW Department of Primary Industries advises:

"To check for nodulation use a shovel, a bucket of water and some elbow grease, dig up some plants, wash the roots and inspect.

Adequate nodulation is something like 20 to 30 small pink nodules on the root system of any individual plant." See the guide over the page.

If your legumes are not nodulating well, then test your soil for pH, Aluminium, Sulphur, Phosphorous and Molybdenum.

Late winter, when the plants are mature, is the ideal time to look for nodules.



Local Land
Services

We help secure the future of agriculture and the environment for NSW communities.

www.lls.nsw.gov.au

How to do it

- Dig up some plants, being careful to keep the root system intact.
- Gently wash the roots and inspect.
- Use the chart below to assess the nodulation.

Adequate nodulation is something like 20 to 30 small pink nodules on the root system of an individual plant.

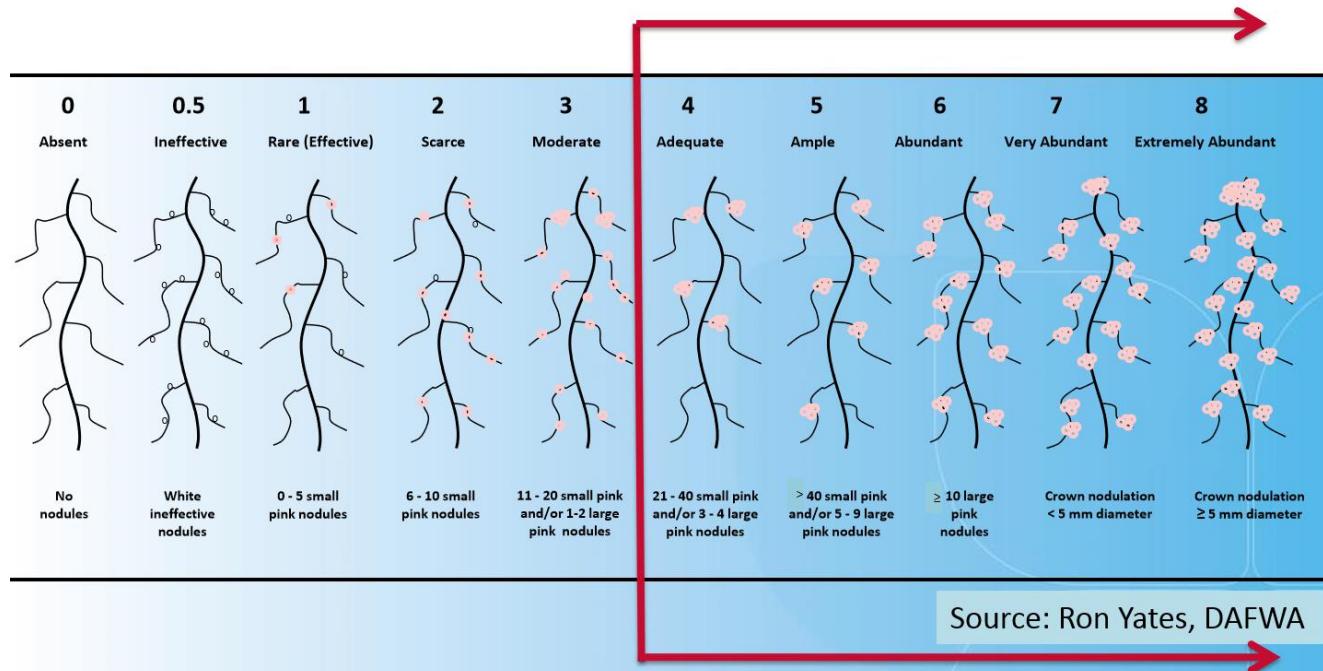
The photo on the right shows adequate nodulation.

Photo by Jo Powells from South East Local Land Services

Nodulation Score Chart from Dr Ron Yates, DAFWA (Yates et al 2016).



Nodulation scores



References:

- Hackney, B., Jenkins, J., Powells, J., Edwards, C., Orgill, S., DeMeyer, S., Edwards, T., Howieson, J. and Yates, R. (2017). *Nodules or not – a survey of pasture legume nodulation in central and southern NSW*.
 Yates, R., Abaidoo, R., Howieson, J. (2016) Field experiments with rhizobia. In 'Working with rhizobia.' (Eds J Howieson, M Dilworth.) pp. 145-166. (Australian Centre for International Agricultural Research: Canberra, Australia)