

# Grower guide to assessing legume nodulation

## Mid North of South Australia

(Faba bean, Field pea / Vetch, Lentil, Chickpea)

- Was your legume inoculation successful? If you didn't inoculate, should you do so in future?
- You can check to see if this year's legume nodulation is adequate.
- See short, instructional videos at: [www.ua.edu.au/legume-inoculation](http://www.ua.edu.au/legume-inoculation)

### METHOD

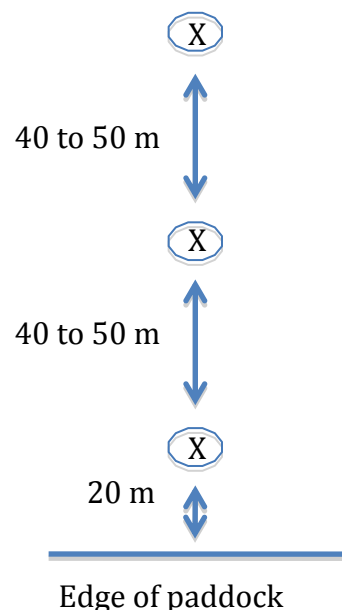
1. In late winter or early spring (or about 10 – 12 weeks after sowing), collect about 30 plants, 10 at each of 3 sample spots (see sample pattern diagram), putting each sample of 10 in a separate bucket.
2. Carefully wash off the soil in a bucket of water and rinse roots once or twice to remove remaining soil. (Soak for up to 30 min for heavy soils).
3. Score each plant for adequate / poor nodulation (refer to photos of adequate and poor nodulation and desirable numbers of nodules per plant, see over). Sort plants into two groups: adequately and poorly nodulated, work out the % plants adequately nodulated and then the average score for the three sampling locations. For easier assessment, float the roots in water on a white background.

#### Equipment needed



Buckets, spade, water

#### Sampling pattern (sample at "x")



### OVERALL AVERAGE NODULATION SCORE:

Overall success rating	
<b>Adequate</b>	70% or more of plants rated adequate
<b>Borderline</b>	50 – 70% of plants rated adequate
<b>Poor</b>	Less than 50% of plants rated adequate
<b>None</b>	No nodules present (= no nitrogen fixation)

NOTE: Plants scored as *Adequate* should have most nodules with a red/pink colour inside (actively fixing nitrogen).

**FABA BEAN**

*Adequate*



50 to 100 nodules per plant  
(20 nodules per plant on lighter soils)

*Poor*



Less than 15 nodules

**PEA / VETCH**

*Adequate*



Photo: Liz Farquharson SARDI

50 to 100 nodules  
(20 nodules per plant on lighter soils)

*Poor*



less than 20 nodules (red-brown earth)

**LENTIL**     *Adequate*



50 to 100 nodules  
(20 nodules per plant on lighter soils)

*Poor*



less than 20 nodules (heavier soil)

**CHICKPEA**     *Adequate*



Adequate: 10 to 30 nodules;  
note multi-lobed nodules around crown

*Poor*



Photo: Andrew Heath

### **What if the nodulation score is poor?**

1. Sample elsewhere in the paddock to see if it is a localised problem or not.
2. Answer the questions in the next column.
3. Look for further information on troubleshooting:  
e.g. the “Nodulation Assessment Guide” or “Inoculating Legumes: A practical Guide”, via [www.ua.edu.au/legume-inoculation](http://www.ua.edu.au/legume-inoculation)  
(Internet search: legume growers resources).

### **Inoculant groups:**

Use correct inoculant type

<i>Pea / Vetch</i>	<i>Group E or F</i>
<i>Faba bean / Lentil</i>	<i>Group F or E</i>
<i>Chickpea</i>	<i>Group N only</i>

### **Selected troubleshooting questions for poor nodulation of freshly inoculated legumes:**

- Incorrect inoculant group used?
- Inoculant mixed with poor quality water (eg saline or chlorinated)?
- Inoculant combined with potentially toxic pesticides, trace elements or organic amendments?
- Inoculant combined with fertilizer?
- Dry sowing into paddock with no background of correct rhizobia?
- Sowing into extremely acidic soil (pH less than 5 in CaCl<sub>2</sub>; except for lupin inoculant)?
- Was soil waterlogged for an extended period during the growing season?
- Herbicide damage from previous or current crop? (NOTE: SU herbicides in alkaline soils can dramatically inhibit nodulation of legumes in following years).

**NOTE:** If it is the first time to grow this legume crop in the paddock, the rate of inoculant application can be doubled.

*This guide is based on the work of Janine Sounness, formerly pulse agronomist with Agriculture Victoria, Horsham*

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Photos: Maarten Ryder, University of Adelaide, unless indicated