

Strain diversity of rhizobia occupying lucerne and Caucasian clover nodules in New Zealand high country soil.

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Background

Low soil pH with toxic levels of aluminium (Al) limit legumes in the high country of NZ (eg. Lees Valley).

Methods

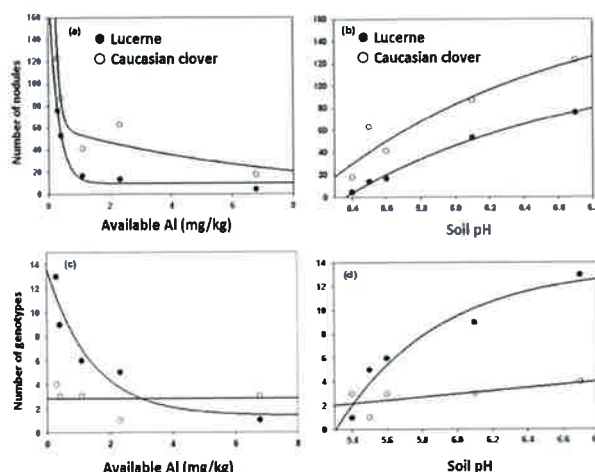
- Lucerne and Caucasian clover seeds inoculated with commercial rhizobia strains (RRI128 and ICC148).
- Grown for 228 days in 0.8 × 0.15 m PVC columns containing Lees Valley soil.



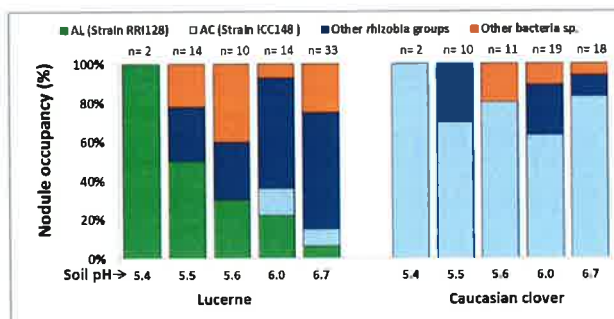
- Soil pH_(H2O) elevated by incorporated lime.
- 73 isolates from lucerne and 60 from Caucasian clover.
- Genotyped using ERIC-PCR and grouped according to banding pattern.
- Strains identified by the sequence of the 16S rRNA gene region.

Objective

Quantify nodulation and genetic diversity of strains recovered from lucerne and Caucasian clover, grown in soils of low pH and high Al.



Number of nodules (a, and b), and number of genotypes (c, and d) occupying lucerne and Caucasian clover nodules in the Lees Valley soil.



Nodule occupancy by bacterial genotypes in soil with different pH in the Lees Valley.

Results

- Seven naturalized strains of *S. meliloti* in lucerne nodules, displaced RRI128 in soil pH_{H2O} 6.0-6.7.
- **Lucerne:** Nodule occupancy by RRI128 decreased from 100% to 6% as soil pH elevated to 6.7.
- **Caucasian clover:** ICC148 the only strain in nodules, occupied >60% in different soil pH.
- Increasing genotype diversity in lucerne nodules as soil pH increased and Al decreased.
- Caucasian clover nodules occupied by 1-4 genotypes (ICC148, *S. meliloti*, and two *Pseudomonas spp.*).
- Number of nodules per pot decreased as Al became available.

Conclusions

- Al toxicity had more severe effects on lucerne nodulation than Caucasian clover.
- Naturalized *S. meliloti* strains were able to displace the commercial strain in lucerne nodules.
- High specificity of Caucasian clover for nodule occupants.
- Lack of genetic diversity of *R. leguminosarum* occupying Caucasian clover nodules in the Lees Valley soil.

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