Caucasian clover responses to fertiliser, lime and rhizobia inoculation at Lake Heron Station, Canterbury

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Note:
This presentation was made by Dr Alistair Black on 7 Nov 2014 in Alexandra at the New Zealand Grassland Association Annual Conference.

It is associated with the following scientific publication:

Caucasian clover

Persistent once established

Requires special rhizobia

Slow to establish

Seed production is difficult

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1. Yield of a mature stand of Cc and its response to superphosphate and lime
2. Use of nitrogen fertiliser to improve establishment of a new stand of Cc
★ Mature stand of Cc
★ New stand of Cc
Mature stand of Cc

680 m a.s.l.
Sown 2002
No fertiliser since sowing
pH 5.5, Olsen P 5
Super: 0, 100, 200 & 400 kg/ha
Lime: 0 and 5 t/ha of lime
Four replicates, 12 x 20 m plots
DM yield in spring, summer and autumn
2012/13 and 2013/14
Caucasian clover yield

9 months (Nov 2012)

23 months (Nov 2013)
Nov 2012

Control

Olsen P 11
pH 5.5

400 kg/ha super
5 t/ha lime

Olsen P 14
pH 6.0
Aboveground shoots
1620/m²
Biomass 5.1 t DM/ha
Taproots 9/m²
New stand of Cc

765 m a.s.l.
‘Native’
pH 5.5, Olsen P 7
1) 110 kg/ha super (nil N)
2) 100 kg/ha Cropmaster 20 (20 kg N/ha)
20 kg N/ha

11 weeks later (Mar 2012)
Cc plants 11 weeks after sowing (Mar 2012)

<table>
<thead>
<tr>
<th></th>
<th>Starter N (kg/ha)</th>
<th></th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Plants/m²</td>
<td>45</td>
<td>43</td>
<td>NS</td>
</tr>
<tr>
<td>Shoot dry weight (mg)</td>
<td>6</td>
<td>17</td>
<td>&lt;0.01</td>
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<tr>
<td>Nodulation†</td>
<td>1.0</td>
<td>1.2</td>
<td>&lt;0.05</td>
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</tbody>
</table>

†1 = no nodules, 5 = abundant nodules
11 weeks (Mar 2012)
11 months (Nov 2012)

20 kg N/ha
Rhizobia effectiveness

plant dry weight (g)

Root Shoot

I, SP, L
I*SP, I*L, SP*L

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Inoculated seed

-SP    +SP
No lime

-SP    +SP
Lime
Bare seed

-SP      +SP
No lime  Lime
Conclusions

1. Mature stand
   - Persisted for 10 years without fertiliser since sowing
   - 2400 and 1000 kg DM/ha of clover per year at this site
   - Cc yield requires P and S as for other clovers

2. New stand
   - Cc must be freshly inoculated with specific rhizobia
   - Poor inoculation was not overcome by N fertiliser