MY LEGUME PROJECT IN THE FALKLANDS

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The main problems with sheep production in the Falkland Islands are low lambing (60%); high percentage mortality (10 – 20%) and low lamb weight (aprox. 12 kg). Forage crops can help improve this situation as they have better quality and, in some cases, quantity of production than grasslands. Legumes are a good source of feed as they have high protein content; better yield in mixtures and fix Nitrogen. One question we don't know the answer to is, how much nitrogen do legumes fix in the Falklands? This is important to know, because this nitrogen ends up in the soil and can then stimulate grass growth. DoA has carried out a lot of work on what legumes are best adapted to the acid soils found in the Falklands (Lotus and some Clovers have come out as most suitable). Another problem is that Falklands soils have a low pH; low Ca & P; synthetic fertilizer is expensive and is not accepted to organic production systems. One alternative is to use calcified seaweed (to raise the pH, Ca & other minerals) and in this way establish and grow legumes with a good yield and fixing Nitrogen.

I am carrying out research on this subject, supported by a grant from the Chilean Government, registered at Queens University (and here Jim McAdam is my supervisor), and in conjunction with the UK Falkland Islands Trust and DoA in the Falklands. The overall aim of my project is to investigate and determine principal soil factors affecting legume establishment, growth and nitrogen fixation in the Falkland Islands. One part of my study is to study the interactions between acid Soils-Calcified Seaweed-Legumes. My experiments are divided into two parts, some in the greenhouse and labs at Queen's University Belfast and some in the field in the Falkland Islands, at Saladero, Shallow Harbour and Bold Cove. In each of these 3 farms I have grazing exclusion cages to measure the yield, chemical composition and nitrogen fixation of the legumes. To measure how much nitrogen is being "fixed" from the air, I am using ^{15}Nitrogen-isotopic techniques, as these give the most accurate results.

I am analysing calcified seaweed chemical composition, incubation with soil and neutralizing strength and particle size distribution. The latter, because it is the main source of variation of yield response in each of my experiments.

Samples have been taken of Calcified Seaweed from different bags in the field, sieved and particle size distribution measured:

Particle size distribution	**Percentage %**
< 0.25 mm	9.3
0.25 - 1 mm	47.3
1 – 2.4 mm	21.5
2.4 - 4 mm	15.4
4 - 11 mm	4.9
> 11 mm	1.7
TOTAL	**100 %**

What is the important message from this result? First of all, it is known that for any added materials like lime, a good soil effect depends on the fineness of the material. For example the effectiveness in the soil is zero in the first year when this material is over 2.4 mm in size. The effectiveness increases to 50% when the material is between 2.4 – 0.25 mm particle size and finally the effectiveness is 100% for particles below 0.25 mm. If you look at all the Falklands material below particle size 0.25 mm, then the distribution is:

Particle size distribution	**Percentage %**
< 0.25 mm	**9.3**
0.25 – 2.4 mm	**68.8**
> 2.4 mm	**21.9**
TOTAL	**100 %**

So, Calcified Seaweed is a good liming alternative but its effect in the soil is slow, because most of the material is over 0.25 mm. The problem with legumes is that they are more sensitive to acid soil than the grass and the calcified seaweed createds a good soil pH for the new legume seedling. In summary, decreasing particle size of a liming material, decreases the lime rate required to raise soil pH, or in other words, less cost for the same kilograms of Seaweed.

I am now back at Queens in Belfast and analysing my samples, especially for N^{15} which is a complex analytical process. When I have the results I will be able to work out fixation rates and will report these back to DoA and through Wool Press.

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