F.R.I. PROJECT RECORD

NO.

PROPOSALS FOR NEW TRIALS WITH BORON AND PHOSPHORUS

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Note: Confidential to Participants of the National Forest Fertilising Co-operative Program

:This material is unpublished and must not be cited as a literature reference

BORON FERTILISER IN FORESTRY

Proposal

To assess the long term effectiveness of Ulexite (sodium calcium borate) and colemantie (calcium borate)chips as B fertilisers for radiata pine.

Background

Limited experience with Boron fertilisers in Kaingaroa and Ashley Forests, and laboratory work on the dissolution of B, shows that both materials are effective suppliers of "available" B. Further work, both in the field and in the laboratory, is essential to test the behaviour of these fertilisers across a range of soils and climates. The experience gained so far is of limited value on a national scale.

Trial work

Option 1. At establishment

A. Locations

Central North Island on the Pumice Plateau
Marlborough
Nelson
Southland

B. Treatments

Control - no fertiliser B
Sodium borate
Colemanite (2-5 mm)
Ulexite (2-5 mm)

Rate at 6 kg B/ha

C. Measurements

Foliar B levels to be monitored
Dieback assessments
Growth

Option 2. In established stands

The same design would be installed in existing stand (ages 4-6)where growth to canopy closure would ensure maximum demand on the fertiliser source for B.

Provisional costings for field work

Site selection

5 Scientist days @ 400/day	2000
5 Techmician days @ %268/day	1340

Installations

5 Technician days/trial @ $268/day 4 locations	5360
Establishment Cost.....	9700

Measurements

Winter growth 1987 (included in establishment costs)
Summer foliage 1988

1 technician day/trial 4 trials	1072
Foliage analyses 80 samples @ $30/sample	2400
Data analyses 80 plots @ $25/plot	2000
Report	300
	5772
Total cost to April 1988.....	14472

Provisional costings for study on soil "available" B

Topics

* literature review
* testing of existing methods/development of new methodology

6 Scientist weeks @ $2000/week	12000
6 Technician weeks @ %1340/week	8040
	20040

PAPR IN FORESTRY

Background

FRI now recommends that forest managers wishing to apply phosphate (P) fertiliser to forest deficient in P change from single or triple superphosphate to PAPR phosphate (partially acidulated phosphate rock). We recommend the change based on earlier work with "super/rock" mixtures which "mimic" PAPR phosphate. PAPR phosphate has all the advantages of a supperphosphate/rock phosphate mixture without the disadvantages (incompatability in granule size, and difficult to spread by ground or air).

The question of degree of acidulation required for forestry use is not known. PAPR phosphate imported from the USA is 30% acidulated. This may be excessive for forestry. The East Coast Fertiliser Company has made available experimental batches of HYPHOS (their equivalent of PAPR) at lower acidulation rates. A product manufactured to forestry requirements is now a possibility. The cost savings are likely to be about 10% for each 10% reduction in acidulation.

Application rates

Recent results reported by Hunter and Graham (1983) on soils from the Auckland region showed growth responses to P to be similar between 75 and 150 kg p//ha. The optimum rate of application may be lower, particularly on second rotation soils with histories of heavy applications of superphosphate in the first rotation.

Proposal

To determine the optimum rate of acidulation of GRP as a forestry fertiliser, and to determine optimum rates of application.

Approach

Our proposal is to test the effectiveness of partially acidulated phosphate rock at lower rates of acidulation than currnetly available, on second rotation forest soils having a history of P fertiliser in the first rotation. The fertiliser will be used at various acidulation rates, and will test the case for reduced phosphate application rates.

The desigh will test the following fertilisers:

* unacidulated PR
* PAPR at 20% aciduation
* PAPR at 250% aciduation
* PAPR at 30% aciduation
* triple super

at 25, 50 and 75 kg P/ha, with and without nitrogen. The N component is to test the N response across the P rates by acidulation.

The trial will have a factorial design with 32 treatment combinations. The will only be 2 complete replicates of each treatment combination. However, the factorial structures effectively increases this replication. For example, within each replicate there will be 6 plots for each level of acidulation. This should result in adequate precision for the main effects and first order interactions, The highest order interaction (which is of less interest) will be less precisely determined. To increase the efficiency of the experiment and reduce the site effects to a minimum, an incomplete block design will be used with 4 plots/block.

Budget for establishment and maintenance

Site Selection	
3 Technician mandays	804
Layout	
3 Scientist mandays	1200
4 technician mandays	1072
Fertiliser application	
3 Technician mandays	804
	3880
Foliage collection 1988	
2 technician mandays	536
Analysis @ 44/plot	2816
Winter measurements	
2 Scientist mandays	800
2 technician mandays	536
analysis @ 25/plot	1600
	6288

Total cost to first measurement..... $10168