

An assessment of the potential for direct application reactive phosphate rock in Australasian agriculture

B.F. Quin

Quin Consultants Ltd P.O. Box 24-020, Auckland, New Zealand

The literature relating to the agronomic performance of direct application phosphate rock in Australasia describes a very wide range of results and conclusions, ranging from very negative (1) through varying degrees of optimism (2, 3, 4). The aim of this investigation was to determine whether those apparently conflicting conclusions could be rationalised.

Methods

A search was made of all available Australian and New Zealand literature, dating back to the 1920s, relating to field experimentation with direct application phosphate rock, and particularly comparisons with water-soluble forms of phosphate such as single superphosphate. A selection of the key references is given below (1, 2, 3, 4).

Results and discussion

The results of the literature search lead to the conclusion that within certain parameters, the agronomic effectiveness of PR can be predicted to at least equal that of superphosphate per unit P. These parameters are:

site parameters:

- maximum soil pH of 6.1 (in water)
- minimum annual rainfall of 500 mm
- developed pasture or pasture crop rotations; not short-term crops
- assessment made over a minimum of five years
- sulphur supplied if required

phosphate rock parameters:

- phosphate rocks must be highly reactive type if soil pH above 5.5 or rainfall is below 700 mm
- must be finely ground (-100 mesh) if not highly reactive
- if granulated must be water dispersible

It is calculated that approximately 50% of all Australasian agricultural production falls within these parameters.

The advantages of PR over superphosphate include:

- lower cost per unit P
- sustained release properties agronomically more suited to stop/go fertiliser use patterns on Australasian farms

- reactive PRs (RPRs) have a neutralising value, offsetting the soil acidification effects of developed pastures
- lower plant availability of trace impurities such as cadmium, which tend to be made more soluble in the superphosphate process
- allow usage of Australia's gypsum resource to meet S requirements, instead of manufacturing still more of it.

References

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