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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Response of an improved pasture to different phosphoric fertilisation strategies in basaltic soils

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Key words: pasture, legume, phosphorus, fertiliser

Introduction Phosphoric fertilisation and broadcast seeding of a legume is a valuable technology to improve native pastures. Phosphorus (P) represents the main input cost for these pastures, with a large impact on their productivity. The objective of this trial was to evaluate sources and levels of P fertiliser on such pastures.

Materials and methods The trial was conducted on a medium to deep basaltic soil (Molisol), at Glencoe Experimental Farm in a temperate to subtropical climate. The main properties of the selected soil, from 0-10 cm depth were: pH (water): 5.7, organic carbon: 45.3 g/kg and available P (citric acid): 3.8 mg/kg. The native canopy was sprayed (glyphosate), and white clover (*Trifolium repens*) cv. Zapicón was broadcast seeded. A factorial arrangement of 3 P fertilisers (superphosphate, SP, 23% P₂O₅; Gafsa phosphate rock, GPR, 28% P₂O₅; Hyperfos, a mixture of superphosphate and rock phosphate, Hy, 27% P₂O₅) and 4 initial levels (0, 40, 80, 160 kg P₂O₅/ha) with 4 replications in a split plot design was used. At the beginning of the second year, split plot received 2 levels (0, 40 kg P₂O₅/ha) of an annual application of each source for every initial dose. The main evaluation consisted of botanical composition (BC) and forage dry matter (DM) measurements from harvests with an experimental rotary mower. The plots were cut every time pasture reached 18-20 cm, leaving a stubble residue of 4-5cm. Analysis of variance was performed on data recorded and adjusted regression equations were developed for legume production to the initial treatments. Relative efficiencies (RE) with reference to superphosphate, were estimated using significant regression equations.

Results and discussion Average cumulative white clover forage yield during the 4 year period, for the 3 P fertilisers, varied between 3617 and 13898 kg DM/ha depending on initial dose, without any annual P application. This represents a legume increase of 58 kg DM/kg P₂O₅. On average, RE was 134 for GPR and 122 for Hy, relative to SP (100). In the refertilised situation (initial plus annual applications of 40 kg P₂O₅/ha), legume forage yields during the 4 year period, for the 3 P fertilisers averaged, varied between 13842 and 24990 kg DM/ha depending on initial dose. This represents a white clover increase of 67 kg DM/kg P₂O₅. The average RE, was 135 for GPR and 167 for Hy, relative to SP (100). When only the effect of the annual applications was considered, 87.3 kg DM/kg P₂O₅ were produced on average. Even though the soil considered does not offer optimal pH conditions for the use of GPR and Hy, it is possible that differences among plants in their ability to utilize P from such sources explain the response, in agreement with Khasawneh and Doll (1978). White clover would have a higher capacity of rhizosphere acidification and calcium and P absorption. Previous national results show a similar behavior of white clover in other soils, when GPR is utilized (Morón, 2002; Risso y Morón, 2002).

Conclusion There was a significant effect of the initial P doses and of the annual refertilisation in the legume yield. GPR and Hy fertilisers were significantly more efficient compared to SP, for both the initial fertilisation and the refertilisations. Such RE, combined with responses higher than 50 kg DM/kg P₂O₅, present important practical connotations.

References

- Khasawneh, F.E.; Doll, E.C. 1978. The use of phosphate rock for direct application to soils. *Advances in Agronomy*, 30: 159-206.
- Morón, A. 2002. Posibles usos de fosforitas para mejoramientos de pasturas en zonas ganaderas tradicionales en Uruguay. *INIA Serie Técnica* 129, p. 97-114.
- Risso, D.F.; Morón, A.; Zarza, A. 2002. Fuentes y niveles de fósforo para mejoramiento de campos en la región de Cristalino. *INIA Serie Técnica* 129, p. 115-151.