

PLANT AVAILABILITY OF PHOSPHORUS, NITROGEN AND MAGNESIUM APPLIED WITH MAGNESIUM-AMMONIUM-PHOSPHATE (STRUVITE) DERIVED FROM ANIMAL SLURRY

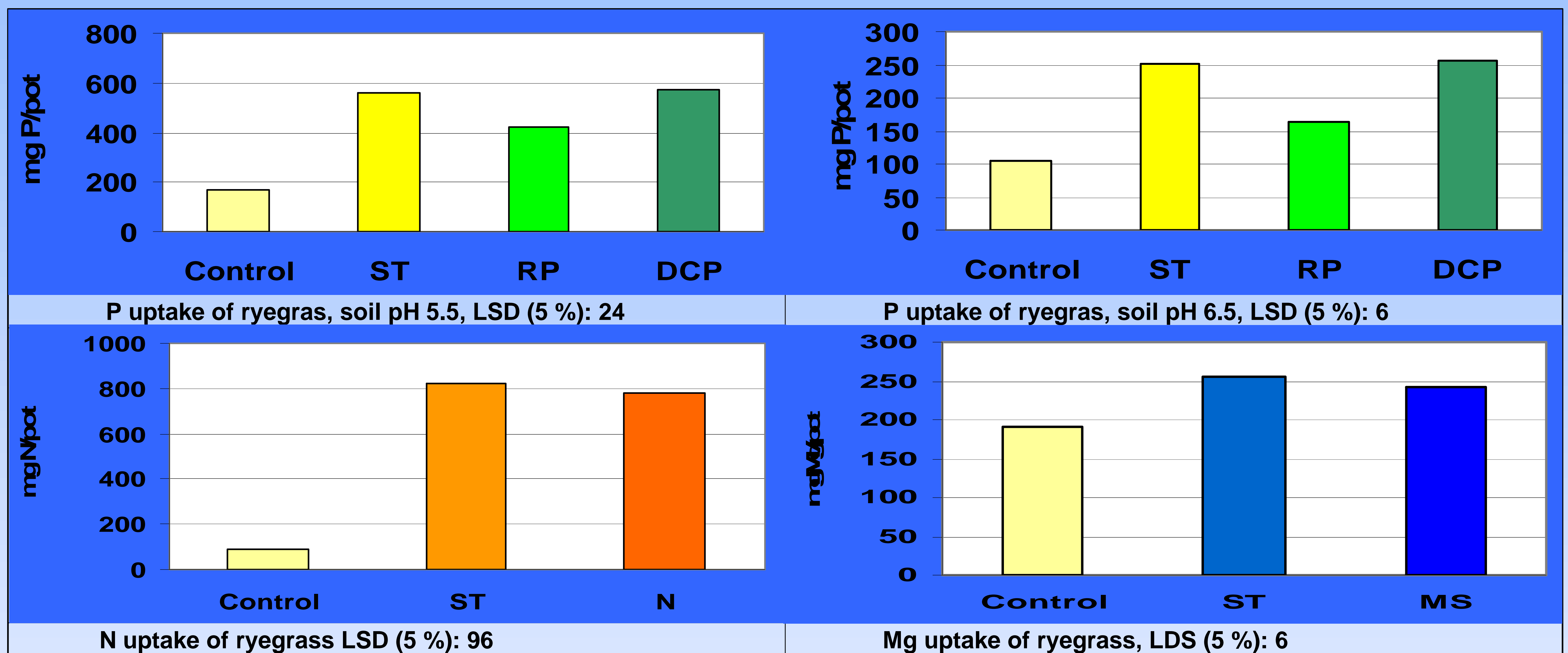
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Introduction

Recovery of N and P from animal slurry has the potential to enable farmers to better control the application of both plant nutrients. To convert NH_4^+ and PO_4^{3-} in slurry in a concentrated mineral fertiliser, different crystallisation techniques exist. One of these techniques is the struvite (MgNH_4PO_4) crystallisation, where the PO_4^{3-} , NH_4^+ and Mg^{2+} concentration in slurry must meet or exceed a minimum concentration.

In Northrhine-Westfalia (Germany) in a pilot plant, which was sponsored in the frame of EUREGIO programme of the EU and a co-operative of farmers P and N were separated from slurry as struvite. We investigated the availability of both plant nutrients in struvite as well as Mg in a pot experiment with commercial P, N and Mg fertilisers.

Results



Exploitation (%) of P, N and Mg applied with struvite and commercial fertilisers

Treatment	P		N	Mg
	Soil pH 5.5	Soil pH 6.5		
ST	27	57	81	52
RP	24	23	--	--
DCP	27	59	--	--
N	--	--	69	--
MS	--	--	--	45

Summary and conclusions

The effectiveness of P and Mg, applied with struvite, is at least in the same order of magnitude as that of commercial fertilisers. On the more acid soil the effectiveness of P derived from struvite is higher as compared with mineral P fertiliser based on soft rock phosphate. The effectiveness of N supplied with struvite is higher as compared with that of the commercial fertiliser. Our results confirm that struvite is an effective P, N and Mg fertiliser. Therefore it is useful to further develop the the technique of struvite precipitation for animal slurry.

Materials and methods

Completely randomized pot experiment with four replications

P experiment: luvisol derived from loess ($\text{pH}_{\text{CaCl}_2}$): 6.5 and a mixture of a brown earth and quartzsand ($\text{pH}_{\text{CaCl}_2}$): 5.5; 0.6 g P_2O_5 /pot as struvite (ST), mineral P fertilizer based on soft rock phosphate (RP) and dicalciumphosphate (DCP)

N experiment: brown earth ($\text{pH}_{\text{CaCl}_2}$): 5.5; 1.0 g N as struvite and $\text{NH}_4\text{NO}_3 + \text{CaSO}_4$ (N)

Mg experiment: brown earth ($\text{pH}_{\text{CaCl}_2}$): 0.4 g MgO as struvite and MgSO_4 (MS)

The other nutrients were always applied in optimum amounts.

Experimental plants: ryegrass (*Lolium multiflorum*)