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“Development on the margin”

Effect of Urine and Ammonium Nitrate Rate on Maize (*Zea mays* L.) Grown on Saline and Non-saline Soils

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Abstract

Urine is inherently saline and despite recent advancement in urine fertiliser research, little is known on its effect on crops under saline soil conditions. Our study aimed at investigating the effect of urine and ammonium nitrate nitrogen rates on maize (*Zea mays* L.) plant performance (leaf area, wet and dry weight yield and height), leaf concentration of N, P, K, Na, Mg and Ca. The experimental setup was a completely randomised block design with 3 salt levels, 2 fertilisers and 2 rates of N application. Salinity was induced by adding NaCl to a soil substrate of compost, loam and quartz sand to achieve target salinities of 0.6, 1.6 and 3.2 dS m⁻¹. Nitrogen doses were 0.18 and 0.36 g kg⁻¹ soil. Basal P and K of 0.18 and 0.27 g kg⁻¹ of soil was added as mono potassium phosphate. Salinity increased leaf N, P, Na, Ca and reduced K while Mg remained unaffected. Leaf nitrogen and Ca contents were higher with urine than ammonium nitrate-fertilised plants. Salinity significantly reduced crop leaf area but there was no N rate or source effect. Under saline conditions, shoot fresh and dry matter was reduced by up to 40 % when urine was used instead of ammonium nitrate. A 5-fold increase in soil salinity was measured on urine-fertilised soils. Soil exchangeable cation content increased with urine application. We conclude that urine can substitute for ammonium nitrate under non-saline conditions. Over-fertilisation with urine under saline conditions may have a deleterious effect on plants while substantially increasing soil salinity and should be used with caution.

Keywords: Ammonium nitrate, electrical conductivity, fertilisation effect of urine, inorganic salts, liquid fertiliser, soil salinity, urine