

Lime requirement assessment methods and lime reaction time on strongly acid soils

ABSTRACT

Elimination of the adverse effects of soil acidity through accurate estimates of lime requirement is essential for optimising alfalfa production. This study was conducted to (i) evaluate two methods of lime requirement; KCl extractable Al and the New Woodruff Buffer and (ii) determine the effect of lime reaction time on soil Al and alfalfa growth. Two strongly acid surface soils were treated with lime at 0, 0.25, 0.5, 1 and 2 times the amount of KCl extractable Al plus the quantity of lime estimated by the buffer (defined L0, L0.25, L0.5, L1, L2 and Lw). Alfalfa (*Medicago sativa* L.) was grown for five successive harvests in a greenhouse on these treated soils. In addition, soils with the same treatments were incubated for 1, 2, 5 and 10 months. Alfalfa yield increased in all harvests with increased lime additions for both soils except in harvest 1 where a growth decrease was observed on the treatment based on the buffer. In later harvests, yield depressions occurred with lower lime treatments, which were attributed to Al toxicity. Soil solution data from the incubated soils showed soluble Al was released with longer incubation times. Liming increased cumulative yields or root weight of alfalfa compared to lime applied at twice the extractable Al. Alfalfa yields were more highly correlated with exchangeable Al than soil pH in both soils. This study suggests that lime requirement of acid and poorly buffered Missouri soils may be more accurately estimated by KCl extractable Al rather than the buffer.

Keyword: Lime; Acid soil; Alfalfa; Calcium; Aluminum