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Effect of application rate of commercial lignite-derived amendments on early-stage growth of Medicago sativa and soil health, in acidic soil conditions

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Commercially available lignite-derived amendments, sold mainly as humate preparations, have been promoted as plant growth stimulants leading to higher crop yields. These products are also claimed to improve soil properties such as pH. This study investigated the effect of application rate of three lignite-derived amendments on the early-stage growth of a pasture legume, lucerne (Medicago sativa), and soil health in a soil type common to south eastern Australia, in a glasshouse setting. An organic-mineral humate product and 'run of mine' lignite coal did not improve shoot or root growth despite application at a range of rates at, and in excess of, the manufacturers recommendation. Application of soluble K-humate product at 20 kg/ha (9.5 kg/ha C equivalent) produced an observable positive effect in shoot growth. At this application rate, a significant delay in the appearance of chlorotic symptoms was observed along with an increase in soil pH concurrent with decreased availability of soil Mn and Al. Higher root dry weight was associated with lower microbial biomass carbon which may indicate an effect on allocation of resources between the microbial community and the plant. An assessment of the effectiveness of lignite-derived amendments on plant growth, as well as their potential to improve the health of an acidic soil will assist farmers in making decisions regarding the use of these products.