

## Effect of poultry litter application depths on wheat growth in an acid Dermosol.

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Soil acidity associated with toxicities and nutrient deficiencies causes significant economic losses to global agricultural crop and pasture production. One of the key plant toxicities is aluminium ( $Al^{3+}$ ) which limits root growth and hence water and nutrient uptake. Agricultural lime is the most common method to ameliorate topsoil acidity but is inefficient to ameliorate subsoil acidity due to its slow movement throughout the profile. Organic amendments supply nutrients and generate alkalinity during decomposition that could help overcome the issues of subsoil acidity.

This column experiment compared the ameliorating effects of poultry litter to lime in an acid, Al toxic subsoil. Aluminium-sensitive wheat (ES8) was grown for 133 days under glasshouse conditions. The poultry litter was applied at a rate of  $15\text{ g kg}^{-1}$  soil and at depths of 10-20, 20-30, and 10-30 cm. Lime was applied at  $8.7\text{ g kg}^{-1}$  as a comparison.

Results showed that the poultry litter applied at 10-20 cm was the best treatment with shoot biomass/grain yield increased by 2.5 and 6 fold compared to the lime and the control treatments, respectively. This was due to the roots having early access to nutrients from the poultry litter which later proliferated below the amended layer due to leaching of nutrients and organic compounds. While the other two poultry litter treatments also increased the plant performance over lime and the control, deeper placement (20-30 cm) or amending more of the soil profile (10-30 cm) were not as effective. Therefore, this study highlights the effectiveness of using concentrated organic ameliorants when applied to the upper layers of acid subsoils.