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# Evaluating Lignite-Derived Products (LDPs) for Agriculture – Does Research Inform Practice?

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Lignite-derived products (LDPs), including humic acids and organo-mineral soil conditioners, are being marketed in many parts of the world. They are promoted as plant growth stimulants, additives that improve plant nutrient uptake as well as providing humic materials to improve soil structure and combat soil degradation. There are mixed views regarding the efficacy of these products and there is a lack of scientific studies that verify the efficacy of these products in the field. Anecdotally, agricultural producers become repeat users of the products when they see economic benefits, such as increases in crop yields, while others abandon repeat use when no benefits were seen. In this paper, we present results from a literature meta-analysis1 and a number of field studies that examine the potential for LDPs to improve soil fertility and plant growth. Our findings suggest that complex interactions between LDPs, soil types, environmental conditions and plant species mean that a 'one-size fits all' product or solution is unlikely; and that changes to soil characteristics brought about by LDPs are more apparent over longer time periods than a single cropping season. Most of these studies have not been undertaken in full field trial conditions, where the crop has been grown to harvest. Limited studies in small plots or glass-house conditions often report early benefits. It is not known if these benefits persist. Moreover, the actual composition of these additives may vary significantly and is rarely specified in full.

In a study of our own, a small plot experiment evaluated the effect of a single application of a commercial potassium humate product from Victorian lignite on ryegrass and lucerne grown in a sandy, nutrient deficient, low organic matter soil. Treatment resulted in increased shoot growth (up to 33%) of ryegrass during the pasture establishment phase. Root growth was also improved with a 47% increase at 0-10 cm depth and 122% increase at 10-30 cm depth. However, these growth benefits subsequently diminished over time. Insignificant growth benefits were observed for lucerne.

The analysis of the literature and our own work indicates that it is difficult to account for all the possible variables where research is used to inform land management practices. Assisting farmers to conduct localised research in cooperative ventures is likely to bring about the best outcomes where site-specific research directly informs land management practices.

1. Michael T. Rose, Antonio F. Patti, Karen R. Little, Alicia L. Brown, W. Roy Jackson, Timothy R. Cavagnaro, A Meta-Analysis and Review of Plant-Growth Response to Humic Substances: Practical Implications for Agriculture, Advances in Agronomy, 2013, 124, 37-89