

Cross-sector integration: the key to successful innovation with biochar in agriculture?

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Declining organic carbon content in intensively managed agricultural soils of Australia could threaten sustainable production into the future. Without significant land-use change, conventional management options struggle to equivocally demonstrate an increase in soil organic carbon (SOC) while also maintaining productivity under Australian conditions. Although biochar has proven to be more stable than other organic amendments, its use in broad-acre agriculture presents significant practical and economic challenges that hinder adoption. Consequently there has been a shift towards the integration of biochar with other mineral and organic amendments. Development of carbon enhanced fertilizers may offer a practical innovation that provides slow release characteristics and benefits of building SOC over long-term repeat use.

We discuss results from an integrated approach aiming to develop a carbon enhanced organic fertilizer based on composted chicken litter with hardwood biochar. Biochar (1%) was incorporated with chicken feed before using the resulting litter in composting. Compost wind-rows included \pm additional biochar treatments. Finally the material was granulated (\sim 4 mm) and used in subsequent experiments assessing rates of nutrient release (laboratory incubation) and impact on crop growth (pot and field trials). At a modest commercial scale (>12,000 birds/shed) the trial has demonstrated value in improving egg production (+2%) where birds were performing below industry targets. Changes in the quality of the chicken litter and compost were demonstrated through nuclear magnetic resonance (NMR) spectroscopy and are discussed in relation to nutrient release rates. The value of the granulated fertiliser in supporting plant growth in the short-term (1st season) is currently being assessed, with continued repeat-use required to assess long-term impacts on soil quality and carbon content.