

Changes to soil organic carbon following soil modification: A South Australian perspective

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The addition of clay to sands has been widely undertaken in South Australia since with the first recorded clay spreading occurring in the 1970's. Clay addition has led to increases in agricultural production and changes to soil physical and chemical properties. Analysis of over 1100 soil characterisations in South Australia has shown a positive correlation between clay percentage and soil organic carbon (OC). The addition of clay should therefore increase the OC stock but has this actually occurred? Analysis of OC concentration on over 100 previously clay modified sites compared to a small number of unmodified controls has delivered variable results; with OC stock increases between 0 and 22 tha⁻¹ in the 0-30 cm when compared to a suitable non-modified sand. The data does identify that OC concentrations are altered where the A1 and A2 horizons are mixed and the greatest increase in OC stocks occurred in the 10-30 cm depth where clay has been incorporated into the bleached A2 horizon. The large variability in the results are hypothesized to be a result of a number of factors including; time since clay addition, amount of clay added, size of the clay clods, depth of incorporation, the nutrient status of the soil and the amount of organic material incorporated with the clay. It is not known if the modified soils have reached a new OC equilibrium or if they are requiring further time to reach maximum capacity. These results provide further understanding of the changes to OC over time and will assist in developing the most effective options for building OC in clay modified soils. Apart from the potential increases to agricultural production from increasing OC, developing the capacity to predict changes to OC following clay addition may also allow farmers entry into carbon trading markets.