

Rapid method for assessment of soil structural stability by turbidimeter

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A rapid and inexpensive method to evaluate soil structural stability via assessment of soil clay dispersion from none to very high dispersion would provide critical information for decision making of soil and agricultural management not currently undertaken due to the expense of testing. The aim of this work was to validate the use of a turbidimeter for quantifying clay released from soil and to relate this back to dispersive parameters.

Ten Australian soils with different physical and chemical properties were studied. Six-step dilution was used to adjust the clay suspensions sequentially by dilution at 75%, 50%, 25%, 12.5%, 6.25% and 2.5% from a datum concentration of 4000 NTU. The linearity of turbidity by dilution was verified through examination of the effect of soil colour and mean particle size.

There was a strong correlation between the amount of dispersed clay (mg/L, % of soil) and turbidity (NTU) for each soil. Clay particle size was related to turbidity response, although the coefficients between turbidity and dispersed clay were very close irrespective of mean particle size differences. Therefore, the amount of dispersed clay (mg/L) can be accurately measured by turbidimeter after spontaneous and mechanical dispersion. A quantitative dispersion assessment chart was developed for rapid assessment of soil structural stability, with application of this providing rapid diagnosis and an important index for soil management. Additionally, when dispersed clay (mg/L) was combined with pH and electrical conductivity parameters, the exchangeable dispersive percentage was reasonably predicted at a resolution useful for farm management decisions.