



Visual soil evaluation – future research requirements

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A review of Visual Soil Evaluation (VSE) techniques (Emmet-Booth et al., 2016) highlighted their established utility for soil quality assessment, though some limitations were identified;

(1) The examination of aggregate size, visible intra-porosity and shape forms a key assessment criterion in almost all methods, thus limiting evaluation to structural form. The addition of criteria that holistically examine structure may be desirable. For example, structural stability can be indicated using dispersion tests or examining soil surface crusting, while the assessment of soil colour may indirectly indicate soil organic matter content, a contributor to stability. Organic matter assessment may also indicate structural resilience, along with rooting, earthworm numbers or shrinkage cracking.

(2) Soil texture may influence results or impeded method deployment. Modification of procedures to account for extreme texture variation is desirable. For example, evidence of compaction in sandy or single grain soils greatly differs to that in clayey soils. Some procedures incorporate separate classification systems or adjust deployment based on texture.

(3) Research into impacts of soil moisture content on VSE evaluation criteria is required. Criteria such as rupture resistance and shape may be affected by moisture content. It is generally recommended that methods are deployed on moist soils and quantification of influences of moisture variation on results is necessary.

(4) Robust sampling strategies for method deployment are required. Dealing with spatial variation differs between methods, but where methods can be deployed over large areas, clear instruction on sampling is required.

Additionally, as emphasis has been placed on the agricultural production of soil, so the ability of VSE for exploring structural quality in terms of carbon storage, water purification and biodiversity support also requires research.

References

Emmet-Booth, J.P., Forristal, P.D., Fenton, O., Ball, B.C. & Holden, N.M. 2016. A review of visual soil evaluation techniques for soil structure. *Soil Use and Management*, 32, 623-634.