Geophysical Research Abstracts
Vol. 18, EGU2016-7097-1, 2016
EGU General Assembly 2016

Accuracy of quantitative visual soil assessment

Maricke van Leeuwen (1), Gerard Heuvelink (1), Jetse Stoorvogel (1), Jakob Wallinga (1), Imke de Boer (2), Jos van Dam (3), Everhard van Essen (4), Simon Moolenaar (5), Frank Verhoeven (6), and Cathelijne Stoof (1)

(1) Soil Geography and Landscape Group, Wageningen University, Wageningen, Netherlands (maricke.vanleeuwen@wur.nl), (2) Animal Production Systems Group, Wageningen University, Wageningen, Netherlands, (3) Soil Physics and Land Management Group, Wageningen University, Wageningen, Netherlands, (4) Aequator Groen & Ruimte, Harderwijk, Netherlands, (5) Commonland, Amsterdam, Netherlands, (6) Boerenverstand, Utrecht, Netherlands

Visual soil assessment (VSA) is a method to assess soil quality visually, when standing in the field. VSA is increasingly used by farmers, farm organisations and companies, because it is rapid and cost-effective, and because looking at soil provides understanding about soil functioning. Often VSA is regarded as subjective, so there is a need to verify VSA. Also, many VSAs have not been fine-tuned for contrasting soil types. This could lead to wrong interpretation of soil quality and soil functioning when contrasting sites are compared to each other. We wanted to assess accuracy of VSA, while taking into account soil type.

The first objective was to test whether quantitative visual field observations, which form the basis in many VSAs, could be validated with standardized field or laboratory measurements. The second objective was to assess whether quantitative visual field observations are reproducible, when used by observers with contrasting backgrounds.

For the validation study, we made quantitative visual observations at 26 cattle farms. Farms were located at sand, clay and peat soils in the North Friesian Woodlands, the Netherlands. Quantitative visual observations evaluated were grass cover, number of biopores, number of roots, soil colour, soil structure, number of earthworms, number of gley mottles and soil compaction. Linear regression analysis showed that four out of eight quantitative visual observations could be well validated with standardized field or laboratory measurements. The following quantitative visual observations correlated well with standardized field or laboratory measurements: grass cover with classified images of surface cover; number of roots with root dry weight; amount of large structure elements with mean weight diameter; and soil colour with soil organic matter content. Correlation coefficients were greater than 0.3, from which half of the correlations were significant.
For the reproducibility study, a group of 9 soil scientists and 7 farmers carried out quantitative visual observations all independently from each other. All observers assessed five sites, having a sand, peat or clay soil. For almost all quantitative visual observations the spread of observed values was low (coefficient of variation < 1.0), except for the number of biopores and gley mottles. Furthermore, farmers' observed mean values were significantly higher than soil scientists' mean values, for soil structure, amount of gley mottles and compaction.

This study showed that VSA could be a valuable tool to assess soil quality. Subjectivity, due to the background of the observer, might influence the outcome of visual assessment of some soil properties. In countries where soil analyses can easily be carried out, VSA might be a good replenishment to available soil chemical analyses, and in countries where it is not feasible to carry out soil analyses, VSA might be a good start to assess soil quality.