

SOIL QUALITY CRITERIA

Background

The ESSC is dedicated to investigating and realising soil conservation in Europe. The Statutes of the Society set how this is done, e.g. by supporting investigation on soil degradation, soil erosion and soil conservation. However, the term 'conservation' does not explicitly define the ideal state of soil which should be aimed at. It might be useful for the ESSC to address this topic in the context of the interest in indicators of soil quality being discussed at present world-wide.

History tells about several periods characterised by severe degradation of the soil resource (Kjærgaard, 1994). Present-day soil management is often to be based on lessons learned from history. However, the mechanised agricultural systems are manipulating the soil in a way that has never before been seen. Side effects, such as soil compaction, reduced structural stability, surface runoff and water erosion, wind erosion and general reduction in soil fertility, are often reported in literature. Therefore, the scientific community (including the ESSC) has an important challenge in addressing the problems.

The concept of soil quality

The increased awareness of the problems has led to increased attention to the term 'soil quality'; as is reflected in numerous reports from recent international symposia (NN, 1991; Janzen et al., 1992; Doran et al., 1994; Greenland and Szabolcs, 1994; Doran, 1996; Finke, 1996). In a recent review on the topic, Karlen et al. (1997) define soil quality as 'the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation'.

Larson and Pierce (1991) and Doran and Parkin (1994) made an analogue to a human medicine and the former authors suggested a Minimum Data Set (MDS) of soil parameters which could be used to express the 'health' of a soil (like blood pressure and pulse rate for humans). A first step in this respect is the identification of soil parameters that are comparable across several soil types. The concept of 'scoring functions' as suggested by Karlen and Stott (1994) might overcome a problem of different 'scales' for contrasting soils. Further, soil quality indicators should be sensitive to influence of soil management and, the same time, have relatively small fluctuations in the short term compared to the time scale of continued performance of a certain soil management practice. Finally, a soil quality indicator should preferably integrate a number of the more basic soil conditions of importance to the overall function of the soil.

The term 'soil quality' has been widely discussed among scientists and conservationists, especially in North America (USA and Canada) (e.g. Doran et al. 1994; Acton and Gregorich, 1995). The Soil Quality Institute has been formed in the USA for the purpose of acquiring and developing technology for use by soil conservationists and scientists. The goal of this institute is to integrate the concepts of soil quality into conservation planning and resource inventory activities (NN, 1996).

In a recent report entitled *Environment indicators for agriculture*, the Organisation for Economic Cooperation and Development (OECD, 1997) addresses soil quality and the soil quality indicators. Based on work of Bomans et al. (1996) and the North American literature, the OECD recommends further work on the potential of integrating indicators that address the issue of soil quality with other indicators, particularly farm management (OECD, 1997). The European Union also has activities in the area of soil quality. Recently a new topic centre (ETC/S, headed by the ESSC Vice-President, J.L. Rubio) for soil quality has been established in relation to the European Environment Agency (see ESSC Newsletter 1997/2+3, pp. 48-49). The ESSC and the scientific community have the opportunity of interacting with these organisations in the challenges of conserving soil resources.

The soil quality concept is a valuable tool in getting scientists involved with managed soil systems, giving a mutual focus to their research efforts. Studies into soil productivity, biological diversity and impacts on the surrounding environment of agricultural systems should be combined to give a more complete description of the soil resource as a dynamic living system. As stated by Karlen et al. (1997), society demands solutions from science. Simply measuring and reporting the response of an individual soil parameter to a given perturbation or management practice is no longer sufficient.

A strategy for the ESSC

The 'new' concept of soil quality may be regarded as a means of differentiating and quantifying our understanding of soil behaviour, especially in relation to soil conservation. In that way it could be fruitful for the Society to discuss the potential of perhaps identifying in more detail some specific areas of interest, which is the main purpose of this note.

One simple way of highlighting soil quality indicators is to schedule and invite contributions to the next ESSC Congress more specifically for work where the effects of soil degrading processes or conservation activities on soil quality indicators are stressed. Another possibility is to include a special session about soil quality indicators.

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ESSC members are encouraged to respond to the idea the term soil quality could be beneficial in the efforts of the Society to address questions of soil conservation. Any ideas of how the term could be used in future research are welcomed. If you would like to be involved in the construction of an electronic mailing list, please contact Per Schjøning at per.schjonning@agrsci.dk