Valarini, P. J., M. S. Garrido, A. Fernandez Santander, and C. Romero. 2002. Evaluation of biological parameters as indicators of the integral soil health after organic treatments; Comparison with physico-chemical parameters. In: Man and soil at the Third Millennium; Proceedings [of the] International Congress of the European Society for Soil Conservation, Volume 1: 923-928. J. L. Rubio, R. P. C. Morgan, S. Asins, and V. Andreu, editors. Logrona , Spain: GEOFORMA Edicions, S.L.

The purpose of the paper was to study the influence of different types and doses of organic matter incorporated in one soil sample from lower terraces of Tajo river (Spain) on physico-chemical and biological properties. The treatments were: (1) soil samples plus 25 and 50 t/ha of composted animal manure (E25 and E50); (2) soil samples plus 15 and 30 t/ha of several green crop residues and weeds (RC15 and RC30); (3) soil samples plus plant leaf residues of Platanus hispanica (P. acerifolia) (HP15 and HP30); (4) without organic matter addition (control, T); bean seeds (Phaseolus vulgaris) were sowed in every treatment. The physico-chemical and biological parameters were evaluated at the beginning of the experiment and after three months. Results showed considerable increases in the microbiological (exopolysaccharides and alkaline phosphatases and esterases enzymes), chemical (organic matter and cation exchange capacity) and physical properties (field capacity). There is a significant correlation between biological activity parameters (alkaline phosphatases, esterases and polysaccharides) and chemical parameters (cation exchange capacity and oxidizable organic matter). This fact points to the use of those biological parameters as integral soil health indicators. *--CAB Abstracts.*

Vigier, B., E. G. Gregorich, D. Kroetsch, and D. King. 2003. Soil Quality Evaluation Program: Soil quality benchmarks sites: Sites 14 ON & 44 ON - Rockwood; Site description report (Revised edition 2003). From URL: http://res2.agr.gc.ca/ecorc/r1444/index_e.htm

Soil quality has been defined as "***the soil's fitness to support crop growth without becoming degraded or otherwise harming the environment*** **"** (Acton and Gregorich, 1995). However, no quantitative methods to determine soil quality at the farm or regional level are available at the present time. The absence of methodologies to evaluate soil health is in part associated with a lack of understanding of the soil ecological processes in sustaining plant growth and environmental quality (Hatfield and Stewart 1994).

The Research Branch of Agriculture and Agri-Food Canada initiated a pilot project in eastern Canada to establish benchmark sites to monitor trends in soil quality. This study was adopted nationally in 1990 by the National Soil Conservation Program (N.S.C.P.) as part of the Soil Quality Evaluation Program (S.Q.E.P.).

By 1992, a network of 23 benchmark monitoring sites had been established across Canada for assessing trends in soil quality change within existing farm management systems. Various land, soil, and crop characteristics were to be monitored for at least 10 years and characterization of baseline soil and site conditions were to be completed. By 1994, the reporting of baseline datasets was completed for fourteen sites across Canada (Wang *et al.* 1994). However the Rockwood site in Ontario was completed in 1995 and was used as part of a complementary study, through the Ontario-Canada Green Plan program. Studies carried out at the Rockwood site include data collection on microbial biomass and organic carbon, soil enzyme activity, soil organic matter components and spatial variation analyses.

Objectives:

A "case study" approach is used for the benchmark study to monitor the trends in soil quality change. **Two basic assumptions underlie this approach:**

Landscapes of the benchmark sites are representative of major agroecosystems and are managed under typical farm production systems and could be characterized in detail to create baseline data sets to make soil quality assessments; and

Monitoring selected soil variables within these landscapes (benchmark sites) for 10 or more years would allow for the evaluation of trends in soil quality change.

In addition, it was anticipated that benchmark site information could be used to support expert systems research and development for making general statements on soil quality trends regionally and nationally.

National objectives for establishing benchmark sites were the following:

To provide baseline and reseampling data sets for assessing changes in soil quality and productivity indicated by typical farm production systems.

To provide data to test and validate simulation models that predict soil degradation and productivity.

To provide a way to evaluate whether farming systems in the major agricultural regions of Canada are sustainable with respect to soil quality.

To provide a national network of sites that can be used by government and non-government groups to conduct cooperative research.

Virginia Polytechnic Institute and State University, Virginia Cooperative Extension, and Diane Relf. 2001. *Building healthy soil.* From URL: http://www.ext.vt.edu/pubs/envirohort/426-711/426-711.html

This extension material covers basic soil attributes: --

"Caring for the garden soil should be as important to home gardeners as it is to farmers. Improving the soil structure is one of the most important aspects of soil care, and adding organic matter is the most effective way to accomplish this. Organic matter also helps maintain the pH balance of the soil and adds nutrients.

Good topsoil is

relatively dark in color

active with microorganisms, plant nutrients, and organic matter, and

usually has a pH between 5.5 and 7.5 (for non-acid loving plants).

Improve the Soil Structure

As the structure of a soil is made more granular and crumbly by decomposing organic matter, the soil absorbs moisture that would otherwise run off, causing erosion and a loss of nutrients in the process. Good soil structure provides channels through which water and air can filter to greater depths. When rain comes after a dry spell, soil that is hard on the surface is much more subject to rapid runoff and erosion than one that is loose and crumbly.

Organic matter in the soil also ensures a continuous food source for soil organisms. As the organisms decompose the organic materials, they help maintain good soil structure, making the soil a more favorable place for root development. The decomposition process improves the soil structure by developing compounds that cement small soil particles together into aggregates, allowing for both increased drainage and moisture retention. Decomposition also changes the organic matter into inorganic nutrients that can be used by growing plants.

Incorporating organic matter aids in sustaining the organic content of the soil. However, organic matter cannot be built up permanently in the soil because it continually decomposes and disappears; soil building must be a continual process in the garden."

Visser, S., and D. Parkinson. 1992. Soil biological criteria as indicators of soil quality : Soil microorganisms. American Journal of Alternative Agriculture 7, no. 1-2: 33-37.

Visser and Parkinson (1992) review microbiological studies that had been done at a species population level and a community structure level and soil process at the ecosystem level. They argue for an indicator focus at the soil process level (i.e., decomposition rates, soil respiration, microbial biomass carbon, nitrogen cycling, and soil enzyme measurement). --[*from Freyenberger's et al. annotated bibliography: SQI Lit.ID #214, p.9*]