Nambiar, K. K. M., A. P. Gupta, Fu QingLin, and S. Li. 2001. Biophysical, chemical and socio-economic indicators for assessing agricultural sustainability in the Chinese coastal zone. *Agriculture, Ecosystems & Environment*—Special Issue: Papers From the European Union Concerted Action conference: *Unification of Indicator Quality for the Assessment of Impact of Multidisciplinary Systems (UNIQUAIMS),* January 1998 - March 2001 87, no. 2: 209-214.

Agricultural sustainability depends to a great extent upon the maintenance of soil health. There is no single measurement that can be made for its quantification although certain soil biophysical and chemical characteristics are found to be key potential indicators of soil health. An agricultural sustainability index is proposed to measure agricultural sustainability as a function of biophysical, chemical, economic and social indicators. It was tested on a regional dataset from China. It showed marked changes in sustainability over a 9-year period and between regions within the coastal zone. This index appears promising for assessing agricultural sustainability. It permits the comparison of relative sustainability of different agroecosystems and can be used to compare agricultural sustainability across regions, although care must be taken in the choice of rating scale for the component indicators. --*CAB Abstracts.*

Neher, Deborah A. 2001. Role of nematodes in soil health and their use as indicators. 39th Annual Meeting of The Society of Nematologists, June 24-28, 2000, Quebec City, Quebec Canada. At URL: http://www.eeescience.utoledo.edu/Faculty/Neher/Publications/01JON_manuscript.doc

Running Head: "Nematodes and Soil Health: Neher". Source: Cornell University's Soil Health Information Gateway, at URL: http://mulch.mannlib.cornell.edu/TSSearch.html ; Accessed Sept.17, 2003. "This downloadable Symposium paper was presented at the 39th Annual Meeting of the Society of Nematologists (June 2000) in Quebec, Canada. It discusses using nematode communities as bioindicators of soil health."

New Zealand. Environment Waikato, Regional Council. 2003. *Environment Waikato - Soil quality - Key points*. Waikato Regional Council, NZ.

Environmental indicator information about soil quality in the Waikato Region [of New Zealand]. This Key Points page presents bullet points and graphed data for this indicator. More information is available in the Report Card and Technical Information pages; found at **URL:** http://www.ew.govt.nz/ourenvironment/indicators/land/soil/land6/keypoints.htm -- *MSN online abstract..*

New Zealand Institute for Crop and Food Research Limited. 2002. Soil Quality Management System (SQMS), SQMS decision support system, SQMS test kit. From URLs: http://www.crop.cri.nz/psp/sqms/section1.htm ; http://www.crop.cri.nz/psp/sqms/decision.htm

SQMS is a decision support system designed to help farmers monitor and manage changes in soil quality to enhance the productivity and environmental sustainability of mixed-crop farms on the Canterbury Plains of New Zealand.

The SQMS web site provides:

confidential storage and retrieval of SQMS test results and management history information for each registered paddock

detailed interpretation of indicator results based on management history information

comprehensive crop and soil management recommendations to assist farmers to maintain or improve soil quality and crop performance

How does the SQMS decision support system work?The soil quality indicator data collected using the SQMS test kit and user manual are entered by a registered user into the confidential website. This data is stored for each registered paddock and remains confidential to the user and Crop & Food Research.

Once the indicator data have been entered and accepted by the system, the user can request:

a summary of the indicator results for a given paddock over the life of their monitoring programme

detailed interpretations of indicator results for the current monitoring year

recommendations to assist with soil management decisions

--From URL: http://www.crop.cri.nz/psp/sqms/decision.htm -- *MSN online abstract.*

New Zealand. Manaaki Whenua Landcare Research. 1999-2003. *SINDI: Soil quality indicators on the web ;* a web-based tool to measure soil quality [web site at URLs: http://sindi.landcareresearch.co.nz/ ;

http://www.landcareresearch.co.nz/research/rurallanduse/soilquality/SINDI.asp **].**

This web tool summarizes 7 indicators from soil attributes, aggregated in 4 groupings of soil characteristics: soil fertility--as indicated by Olsen Phosphorus; soil acidity--as indicated by pH; organic resources--as indicated by anaerobic mineralizable Nitrogen, total Carbon, total Nitrogen; and soil physical properties--as indicated by bulk density and macroporosity.

———. 2001. Normal ranges for soil indicators. From URL: http://www.landcareresearch.co.nz/

3 types of limits initially proposed for interpretation of indicators are discussed: Level of concern, Environmental bottom line, and Recommended limits for crop productivity.

Norfleet, M. L., D. Dirlam, and B. F. Hajek. 1997. Properties, distribution and land use of soil quality reference soils. American Society of Agronomy Abstracts, no.258.

Use of SQIndex Determiner software, mentioned from Islam and Weil, 2000.

Nortcliff, Stephen. 2002. Standardisation of soil quality attributes. In: *Selected papers from the International Workshop on "Soil Health as a Indicator of Sustainable Land Management"* held at the Goulandris Natural History Museum/Gaia Environmental Research and Education Center, Athens/Kifissia, Greece, 24-25 June 1999John W. Doran, and Stamatis I. Stamatiadis, 161-168.

Preliminary discussion paper; Viewpoint is that soil functions should be the key to researching which indicators are most suitable in developing a soil quality index, and that standards are required at international level; thus advocates ISO methods as they are being developed (Abstract provides philosophical position of author). Discusses physical, chemical, biological, visible soil attributes, and SOM, indicator selection parameters, the issues of scale, sampling, data representativeness, definition of methods, as all necessary to include. Provides a process toward steps to follow to achieve standardization at international level. Concludes that more awareness and co-operation will lead to a "suite of standard procedures" [in] establishing indices of soil quality. (p.167).

Oberholzer, Hans-Rudolf, J. Rek, P. Weisskopf, and U. Walther. 1999. Evaluation of soil quality by means of microbiological parameters related to the characteristics of individual arable sites // .Agribiological Research "Im Druck". [LA=German] From URL: http://www.aramis-research.ch/e/671.html#0810EN [Citation from Swiss Research Information System, accessed Nov.23, 2003.]

Oberholzer, Hans-Rudolf, and Swiss Research Information System. 2003. Kriterien, methoden und iundikatoren zur beurteilung der bodenfruchtbarkeit. // Criteria, methods and indicators for the assessment of soil quality. [LA=German] From URL: http://www.aramis-research.ch/e/671.html

Project begins 20.10.1999 -- Project ends 31.12.2003

Ontario Soil Management Research and Services Committee (OSWARSC). 2002. 2002 report, Ron Bayert, principal researcher. From URL: http://www.gov.on.ca/OMAFRA/english/research/oascc/oswarsc/soil.htm

Recommendation 5: Soil Management and Soil Quality Research leading to determining the effects of soil management practices on chemical, biological and physical soil quality. The present threat of global climate change and soil management issues dealing with carbon sequestration and the reduction of greenhouse gas emissions, warrants a better understanding of the effects of soil management on soil processes. As such, soil management practices, such as tillage, cropping pattern, and fertilization influence soil, water, and air quality. Assessing soil quality and its impacts on productivity and the environment is complicated since research must consider the multiple functions of soil and integrate the physical, chemical and biological soil attributes that define soil function. However, to achieve the goals of high crop yields and quality with minimal environmental impact requires reliable research information that assesses the impact of management on soil quality and on soil use. In addition, the fundamental requirements of profitability and competitiveness must be incorporated into the overall soil management strategy. -- *Online summary.*

Orellana, J. A. de, M. A. Pilatti, and D. A. Grenon. 1997. Soil quality : an approach to physical state assessment. *Journal of Sustainable Agriculture* [Binghamton, NY : Food Products Press] 9, no. 2/3: 91-108.

Organisation for Economic Co-operation and Development (OECD). 1999. *Environmental indicators for agriculture—Volume 1: Concepts and framework.* **Paris, France: Organisation for Economic Co-operation and Development.**

Little quantitative information is available to assess the impacts, both harmful and beneficial, of agriculture on the environment ... http://www.oecd.org/searchResult/0,2665,en_2649_201185_1_1_1_1_1,00.html ; accessed September 09, 2003.

———. *Environmental indicators for agriculture—Volume 2:* "Issues and design". -- *"The York Workshop" [1998],* Paris, France: Organisation for Economic Co-operation and Development (OECD).

Need for soil quality indices was recognized in 1998. Indicators were then developed for OECD use, termed "agri-environmental (AEI) are truly socio-economic factors needed for international policy framework development, and therefore fall within political & socio-economic parameters. Soil quality is examined only in terms of potentials for soil erosion. National bases exist for comparison purposes between/among nations.

———. 2001. Environmental indicators for agriculture—Volume 3: Methods and results. Paris, France: Organisation for Economic Co-operation and Development (OECD).

"During the completion of the OECD (2001) publication Environmental Indicators for Agriculture Volume 3: Methods and Results, an extensive bibliography was established covering the main agri-environmental indicator themes." --From URL: http://www.oecd.org/htm/M00009000/M00009689.htm -- *MSN online abstract.*

"The impacts of agriculture on the environment and the achievement of sustainable agriculture are of major public concern in the context of agricultural reform, trade liberalization, and multilateral agreements...." --From URL: http://www.oecd.org/searchResult/0,2665,en_2649_201185_1_1_1_1_1,00.html ; accessed September 09, 2003.