**Six Categories of Soil Health1 George W. Bird, Professor Michigan State University**

Michigan growers have identified *Soil Health* as a high priority topic for the potato industry. A team was organized to develop a plan of action to be presented to the industry at the 2013 Winter Meeting. *Six Categories of Soil Health* is presented as *Food for Thought* as the industry embarks on its trek to assure healthy soils for future generations.

**CATEGORY I. New Land.-** Forest or grassland soil that has not been used for agricultural purposes for many years. With proper preparation, this type of soil will produce high yields or superior quality crops with no external inputs. Both yields and crop quality will decrease every year after the first crop. Category I situations have been observed five times in potato production by the author of this classification system. Three were following 75 years of maple tree forestation and two were after 10 years of old-field secondary succession.

**CATEGORY II. High quality Soil.-** Soil with microbiologically mediated nutrient cycles that result in excellent yields of high quality crops using only limited supplemental organic inputs designed to replace the matter removed with the previous crop. Growing supplemental organic matter in place through the use of various cover crops is common in these systems. The author of this classification system has observed Category II soil in association with a limited number of highly successful farms. In these cases, a major objective of the farming enterprise was focused on the maintenance of humus.

**CATEGORY III. Non-Degraded Soil.-** Good quality soil where conventional soil nutrient and management practices are used to successfully produce excellent yields of high quality crops with no soil nutrient or soil-borne pathogen problems. Category III soil is not uncommon, but often requires a sound system of crop rotation. There is currently a significant increase in Michigan in the use of cover crops to assist in the maintenance of the quality of Category III soil. Category III soils do not include cyst nematode, potato early-die, scab or other sites with major soil-borne pathogen problems.2

**CATEGORY IV. Degraded/Responsive Soil.-** Soil with significant nutritional or soil-borne pathogen problems that produces good yields of high quality crops through use of conventional soil nutrient, irrigation and soil-borne pathogen management inputs. There currently appears to be an increasing interest in technologies designed to improve the quality of Category IV soil. Category IV soils are frequently cyst nematode, potato early-die, scab or sites with other nematode and soil borne pathogen problems.

**CATEGORY V. Degraded/Non Responsive Soil.-** Soils with significant nutritional or soil-borne pathogen problems that will not produce good yields of high quality crops through the use of conventional soil nutrient, irrigation and soil-borne pathogen management inputs. Category V soil situations are frequently referred to as *Tired Soil* and can result in *survival characteristics* that threaten the existence of both specific farming enterprises the local communities. The author of this classification system has observed Category V. situations on numerous occasions during the last 25 years, including several related to potato early-die.

**CATEGORY VI. Dead Soil.-** Soil that will not grow agricultural crop plants regardless of short-term management tactics. Category VI soils have been observed in a limited number of situations by the author of this classification system.

Basic information on the concept of soil health is presented by Bird, Berney and Cavigelli in the 2010 revision of the 1998 publication entitled, *Soil Ecology*.3 In addition,scientists at Cornell Univ. have developed a comprehensive system for the analysis of soil health that is available at http://soilhealth.cals.cornell.edu/extension/manual.htm.

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2More than ten different species of cyst nematodes have been identified in Michigan. Among these are the Soybean, Beet, Cereal and Carrot Cyst Nematodes. The Golden and Pale Potato Cyst Nematodes have never been detected in Michigan.

3Bird, G. W., M. F. Berney and M. A. Cavigelli. 2010 edition. *Soil Ecology* (In) *Michigan Field Crop Ecology: Managing Biological Processes for Productivity and Environmental Quality*, Cavigelli, Deming, Probyn and Harwood (eds). Michigan State University Extension Bulletin E-2646. East Lansing. 87 pp.