

## **Evaluating the Cornell Soil Health Assessment (Interim Report)**

### **Purpose:**

Over the years growers have made many changes to their cropping systems to improve productivity as well as to make them more environmentally sustainable. Crop rotation, manure applications and residue management have long been promoted as best management practices for the soil. Many growers ask the questions “Is what I am doing making a difference?” and “Is my soil healthy?” A number of measures of soil quality or soil health have been developed over the years. Few of them have been something that is easy to take the samples for and to relate to management practices. Cornell University recently developed the Cornell Soil Health Assessment. It appears to come the closest to something that will meet the needs of agronomists and farmers. The purpose of this project is to quantify, validate and calibrate the Cornell Soil Health Assessment relevant to Ontario conditions. In 2009 this will be initiated on the three long term, field-crop trials that were established over the past four decades by faculty at the University of Guelph: 1) Long Term Rotation trial – Elora Research Station; 2) Long Term Tillage Trial – Elora Research Station; 3) Long Term Rotation Trial – Ridgetown Campus. In 2010 the assessment will be taken to farm fields on a variety of soil types and cropping systems.

### **Methods:**

The Cornell Soil Health Assessment uses a number of indicators in the assessment. They include: aggregate stability (see Fig 1), available water capacity, surface hardness, subsurface hardness, organic matter, active carbon, potentially mineralizable nitrogen, root health, ph, extractable phosphorus, extractable potassium and secondary and micronutrients. Sampling in the field requires the collection of enough soil cores to a 6 inch depth to equal six cups (1.5 litres). Penetrometer readings are to be taken at the same time at a 0-6” (-0-25 cm) depth and 6-18” depth. In the spring and summer soil samples were taken from the long term rotation trials at Elora and Ridgetown as well as the tillage trial at Elora. Samples were taken from every tillage and rotation treatment. Penetrometer readings were taken at a later date. A lab was set up by the OMAFRA soil management specialists to conduct wet aggregate stability tests and root health. The remainder of the soil was sent for Agri-Food Labs for nutrient, organic matter, potentially mineralizable nitrogen and active carbon analysis. The available water capacity will be conducted at Agriculture and Agri-Food, Harrow. In year two the sampling will take place on a number of grower’s fields.

### **Results:**

At this time a significant percentage of the samples are still being analyzed. Data analysis is on going.

### **Summary:**

Some of the early results from the Ridgetown rotation plots indicate that no-till increases aggregate stability significantly compared to moldboard plowing. A corn, soybean and winter wheat with red clover rotation increased aggregate stability significantly over continuous corn, continuous soybean, soybean wheat or corn soybean rotations. The

root health indicator was not as useful as expected as it showed few differences between any of the treatments from the three research trials. More information on the Cornell Soil Health Assessment can be found at: [www.hort.cornell.edu/soilhealth/](http://www.hort.cornell.edu/soilhealth/)



**Figure 1: Apparatus Used in Cornell Soil Health Assessment**

### **Next Steps:**

As the rest of the data is received it will be analyzed. The various components of the test will be assessed for applicability to Ontario conditions. In 2010 samples will be taken from a wide range of soil types and production practices to further evaluate the test for Ontario.

### **Acknowledgements:**

Project funds were provided by Ontario Corn Producers' Association, Ontario Wheat Producers' Marketing Board and the Ontario Soybean Growers.

### **Project Contacts:**

Adam Hayes, OMAFRA [adam.hayes@ontario.ca](mailto:adam.hayes@ontario.ca) (519) 674-1621

Anne Verhallen, OMAFRA [anne.verhallen@ontario.ca](mailto:anne.verhallen@ontario.ca) (519) 674-1614

David Hooker, University of Guelph, Ridgetown Campus [cropdoc2@gmail.com](mailto:cropdoc2@gmail.com) (519) 674-1559

Bill Deen, University of Guelph, [bdeen@uoguelph.ca](mailto:bdeen@uoguelph.ca) (519)824-4120 x53397

**Location of Project Final Report:**