Influence of Soil Texture, Tillage and Management Systems On Soil Quality Indicators.

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Introduction

Soil Quality is the capacity of soil to function in supporting important ecosystem services without a negative interaction with the environment[1]. Soil quality integrates the physical, chemical and biological aspects of the soil for assessing the directional changes due to management practices[2]. In order to assess soil quality, specific soil measurements called indicators are needed, and these indicators can vary with soil texture and previous crop/soil management practices[3].

Decision on which measurements to select for assessing soil quality is often based on:

- the sensitivity of measurement to detect management differences
- the ease and reliability of measurement
- the relationship of measurement to the intended management goal and
- the cost of sampling and analysis[4]

There is an increasing demand to evaluate various biological and physical soil measurements that can serve as potential soil quality indicators[5]. This work evaluates selected biological and physical soil measurements on commercial farms in the Northeastern USA.

Objectives

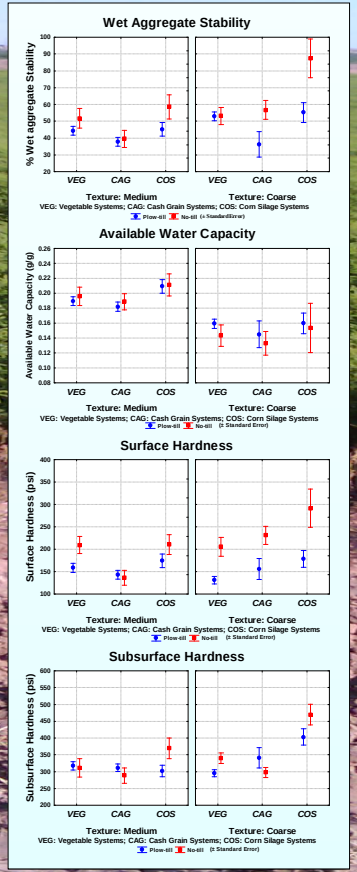
- ❑ Assess the effect of management on soil quality indicators
- ❑ Assess the effect of soil texture on soil quality indicators under different management systems.
- ❑ Assess the effect of tillage on soil quality indicators under different management systems.

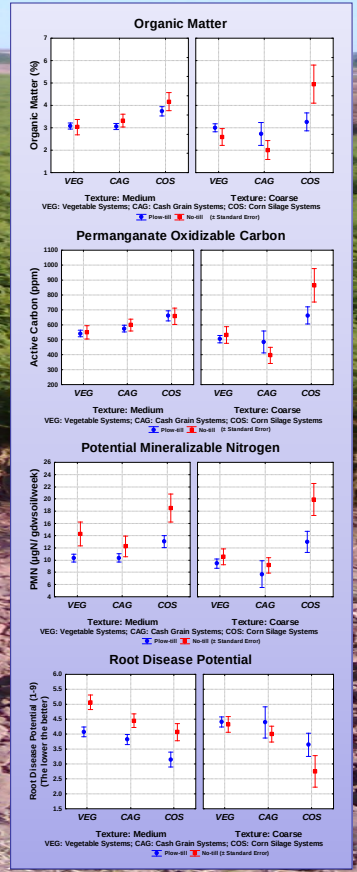
Methods

Soil samples were collected from under different management systems on commercial farms in Northeastern USA. Management studied included cash grain, corn silage and vegetable production systems. These management systems were further classified based on texture (coarse or medium) and tillage (no till [NT] or plow till [PT]). Soil quality indicators were measured for over 700 samples from different fields.

Soil quality indicators that were studied included wet aggregate stability (WAS), available water capacity (AWC), surface and subsurface hardness, organic matter, permanganate oxidizable carbon (POC), potential mineralizable nitrogen (PMN) and root disease potential (bean bioassay method). Sampling protocol and specific field and laboratory methods are given in the Cornell Soil Health Manual[6].

Results





Conclusions

- ❑Response of soil quality indicators to different management systems was dependent on soil texture and tillage.
- ❑WAS, OM and PMN tend to be higher in corn silage system under NT compared to the vegetable and cash grain systems. This may be related to the high levels organic manure inputs into the corn silage system.
- ❑Surface and subsurface hardness were higher in corn silage system especially under NT. This may be a reflection of heavy farm equipment being used for harvesting and manure spreading.
- ❑Coarse texture soils generally had higher levels of subsurface compaction than the medium textured soils especially in corn silage system.
- ❑Root disease potential was generally higher in vegetable system. NT in medium texture soil also tends to have more disease pressure than the PT.

Literature

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