A method for soil health assessment in the conversion to organic farming

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ABSTRACT

The regulation for the assessment of the conversion to organic farming establishes the use of soil/produce pollution and the type of agricultural practices as indicators of performance. However, these indicators don't reflect the complexity of the soil ecosystem and soil health. Therefore, complementary indicators were sought (soil biostructure and field capacity), and a specific three-steps method for the assessment and monitoring of soil health during the conversion process was developed.

Keywords: organic farming; soil health; conversion assessment; soil biostructure

INTRODUCTION

This method was developed as part of a Ph.D. research, undertaken in the UK and in Spain using organic and non-organic farms. The method was developed from both scientific data researched (from literature and data collected) and information elicited from field decision-makers using techniques from social enquiry work. Thus, it is a tool that is scientifically valid, easy to use in the field, and inexpensive for scientists, agronomists, technicians, farmers and landowners. It can be used to monitor soil biostructure evolution (as an indicator of soil health) by measuring soil field capacity (as an indicator of soil biostructure) as frequently as needed.

DESCRIPTION OF THE METHOD

Step 1. Diagnosis: Assessment of field starting conditions by assessing soil health

1.1. History of agricultural practices and their impact on soil biostructure
Data and information were gathered and analysed from interviews and literature research.

1.2. Field assessment of soil type and measure of field capacity and soil pH
Soil type is assessed by observational estimations. Field capacity (Fc) is measured using Spurway's technique (Tamés Alarcón & Peral, 1958; Mata Porras, 2001). The pH is measured by colour-coded estimations. Having obtained these values, if the pH is average, then soil texture and field capacity percentage are matched with Table 1.

1.3. Assessment of soil biostructure degree as indicated by field capacity

The degree of soil biostructure is an indication of the level of soil health. Thus, a soil with a medium degree of soil biostructure indicates a medium level of soil health.

Table 1. Qualitative degree of soil biostructure

Fc	**Soil biostructure degree per soil texture**				
	Sandy	Sandy loamy	Loamy	Loamy clay	Clayey (>2.5% o.m.)
<7%	None/very low	None	None	None	None
7-10%	*Low*	Very low	None/ very low	None	None
11-15%	Low medium	*Low*	Very low	None/very low	None/very low
16-20%	Medium	Low medium	*Low*	Very low	Very low
21-25%	High	Medium	Low medium	*Low*	Low
26-30%	Very high	High	Medium	Low medium	*Low*
31-35%	Very high	Very high	High	*Medium*	Low medium
36-40%	Very high	Very high	Very high	High	*Medium*
>40%	Very high	Very high	Very high	Very high	*High*

Step 2. Intervention: A recommendation of main remediation practices

As a result of Step 1, practices that will increase soil biostructure (i.e. increase soil health) as indicated by an increase in field capacity will be recommended. This will consider practices permitted or recommended in the organic farming legislation as well as traditional practices in the area or innovations from farmers or agronomists.

Step 3. Monitoring: An approximation of the time needed to reach a high degree of soil biostructure.

This third step is aimed at monitoring the evolution of soil biostructure, and hence of soil health, by measuring field capacity changes through the years. A monitoring system is of singular importance because: (a) the soil ecosystem and the conversion process as a whole is dynamic in nature, and we need to know intermediate stages in the process as well as the beginning and the end results, and (b) there is a need for an on-going assessment of the adaptation of practices and policies at the soil ecosystem level. The end of the conversion process would take place when the soil reaches a high degree of soil biostructure.

The time a field will take to reach a high degree of soil biostructure will depend on (a) the starting conditions, (b) the type, intensity and number of remedial practices put in place, (c) soil type and (d) external factors such as climate. The intensity and number of the remedial practices will depend on the farmer's financial status and time available, as well as on personal matters and traditional practices.

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