

Soil health changes with the use of inter-cropping supporting good practice

Problem

Soil health is crucial for the sustainability of any cropping system. Currently, it is unknown how intercropping contributes to soil health and the improvement of systems sustainability.

Solution

Monitoring soil health through key indicators provides information on soil chemical, physical, and biological properties and how well these components are performing.

Benefits

Knowing the state of soil health allows for management decisions to be made to maintain soil- and agro-system sustainability using a selection of robust soil indicators.

Practical recommendations

Farmers and advisors can use [Soil Health Check Cards](#), a scientifically based scorecard that brings together soil health indicators in one excel file with automated cell colouring.

Applicability box

Theme

Soil; Crop production

Keywords

Soil quality; Soil fertility; Soil pH; Soil structure; Soil fauna

Context

Crop production

Application time

Start and end of cropping cycle

Required time

Three hours for each sampling and field measurement

Period of impact

Yearly

Equipment

Spade, plastic sheet, soil structure and earthworm identification sheets, water, auger, bucket, plastic bags, 20 cm diameter plastic ring, 33 cl water bottles, timer.

The scorecard system was adapted to cover the three areas of soil health—chemistry, physics, and biology—using an outline from the UK AHDB GreatSoils method and the Biofunctool® tool. This prototype scorecard was first tested in 7 experimental sites, comparing cereal monoculture, legume monoculture, and cereal-legume intercropping over two cropping cycles (Figure 1).

The indicators taken together provide a quick-and-easy visual representation of the health of the soil investigated—mainly green: good overall, mainly red: soil in poor health with work needed to improve these indicators to green.

Soil Health Component	Test	Field 1		Field 2	
		Crop 1 (arable)	Mixed Crop 1 (arable/legume)	Crop 1 (legume)	Mixed Crop 1 (arable/legume)
Chemical	pH	6.7	6.6	5.3	5.7
	Inorganic N (kg ha ⁻¹)	18	19	32	41
	Ext. Phosphorous (P) (mg/l)	3.2	3.8	9.6	10.2
	Ext. Potassium (K) (mg/l)	50	150	71	69
	Ext. Magnesium (Mg) (mg/l)	53	436	203	342
Physical	Soil Organic Matter (%)	7.2	5.3	10.1	8.2
	Soil Structure (VESS score 1 to 5)	2	4	3	1
	Water Infiltration	341	82	69	351
Biological	Earthworm Numbers/Density	10	1	4	12
	Macrofauna Density	25	12	16	32

Figure 1: Soil Health Scorecard for two fields with visual representation of data with a traffic light system

Further information

Video

- How to assess your soil for structure using the Visual Evaluation of Soil Structure (VESS) method [A guide to the Visual Evaluation of Soil Structure \(VESS\)](#) (Scotland 2018, English)
- How to assess water infiltration rates in soil using the Beerkan method. [Biofunctool Tutoriel Beerkan](#) (Senegal 2022, French)
- How to assess earthworms' density in your soil. [GREATsoils: the worm count test | AHDB](#)

Further reading

- Descriptions of the use of a visual assessment of soil structure [The numeric visual evaluation of subsoil structure \(SubVESS\) under agricultural production](#) (Soil & Tillage Research, 2015)
- Identification of earthworms [SOIL-4pp-chart.pdf](#)
- European Union outline of soil health for all EU countries [Soil health - Environment - European Commission](#) (webpage 2023, multiple languages)

Weblinks

- [Soil health indicators and how to measure them GREATsoils | AHDB](#)
- [Assessing agricultural management practices on soil health Biofunctool | CIRAD - IRD](#)
- Nature Based solutions for improving soil health [Revitalizing Soil Health: Targeted Recommendations for EU Policies - NBSOIL](#) (2022 to 2026)
- Check the [Organic Farm Knowledge Platform](#) for more practical recommendations.

About this practice abstract

Authors: Paul Hargreaves, SRUC Barony Campus, Dumfries, Scotland, UK, DG 3NE, www.sruc.ac.uk and Marie Sauvadet, Campus La Gailarde Institut Agro, INRAE, 1er étage 2 place Viala, 34060 Montpellier <https://www.cirad.fr/>

Publisher: IFOAM Organics Europe, Rue Marie Thérèse 11, 1000 Brussels -BE, organicseurope.bio

Date: April 2026

Contact: Paul.Hargreaves@sruc.ac.uk

Review: Boglarka Bozsogi, IFOAM Organics Europe; Christine Watson, SRUC; Odette Weedon, University of Kassel

IntercropVALUES aims to exploit the benefits of intercropping to design and manage productive, diversified, resilient, profitable, environmentally friendly cropping systems acceptable to farmers and actors in the agri-food chain. As a multi-disciplinary and multi-actor project, it brings together scientists and local actors representing the food value chain. It includes 27 participants from 15 countries (3 continents) from a wide diversity of organizations and stakeholders. The project will run for four years and started in November 2022.

Project website: <https://intercropvalues.eu/>