

WHAT LIES BENEATH - NEW SOIL HEALTH ANALYSIS SERVICE FOR LANDOWNERS LAUNCHED DURING THE UN INTERNATIONAL YEAR OF SOILS

Did you celebrate World Soils Day on December 5th? Many of us wouldn't have been aware that such a day even existed. However, soil is a vital part of our agricultural and ecological security and landscape. Take the traditional roast Christmas dinner, for example - carrots, parsnips, potatoes, sprouts, beans - all grown in soil. The choice of meat, too, indirectly depended on soil - most livestock consumes plant-based feedstuff grown in it. Yet, across the globe, soils are in peril with only an estimate few decades of topsoil left. 2015 was therefore declared the United Nations (UN) International Year of Soils, within the framework of the Global Soil Partnership and in collaboration with Governments and the secretariat of the United Nations Convention to Combat Desertification.



Sean Stevenson

To mark the end of the UN International Year of soils, IET Editor Rachael Simpson spoke to Sean Stevenson of UK based NRM Laboratories about their Soil Health Service, which launched in 2015, as well as what soil analysis entails and what the future looks like for this essential dark matter.

1. Firstly, tell us a bit about NRM Laboratories.

The company originated out of ICI Fertilisers back in 1990 which was based at what is now Syngenta Jealotts Hill Research Centre. The company relocated in 1991 to our current location just a few miles down the road from Ascot racecourse. The company now employs over 80 staff and is part of the Cawood Scientific Group of companies which includes Scianteq Analytical Services and Sci-tech Laboratories. The group in total employs just over 170 staff with 45,000sq ft of laboratory space and processes in excess of 800,000 samples per annum

2. 2015 was the United Nations (UN) International Year of Soils - why are soils so important, and why is there an increased need for awareness of them?

Soils are incredibly important, President Roosevelt once said that "a nation that destroys the soil destroys itself" after the crisis in the US in the 1920's where the erosion of soil led to dustbowls and effectively resulted in 100,000,000 acres of land being stripped of its topsoil. In fact many people may not be aware that over 95% of our food is grown directly or indirectly in soil and that some experts are predicting that at the current rate of degradation we have perhaps only 60 years of topsoil left!

It's also interesting to see famous faces such as Julia Roberts becoming the latest 'Soilebrity' fronting the Save our Soils campaign.

3. NRM launched their Soil Health service in 2015. What does this service offer?

The service we offer takes the key physical, chemical and biological properties of the soil and integrates these together to provide a scientific platform for measuring, monitoring and managing soil health.

4. What sort of instruments play a key role in the lab?

In terms of soil analysis the bulk of the analysis is carried out using Atomic Absorption Spectrophotometers, automated pH units (in order to get through the large sample numbers we process), Rapid Flow analysers and Inductively Coupled Plasma Emission Spectrophotometers. The soil health suite includes Organic Matter analysis by Loss on Ignition using a Thermogravimetric Analyser and Particle Size analysis of the soil using Laser Diffraction instruments. For the measure of biological activity of the Soil we use the Solvita © CO₂ burst test developed by Woods End Laboratories in the United States.

5. How is a typical soil sample analysed at your lab?

Typically we receive soil samples from our customers in the post or via courier and once received at the lab we first need to prepare the sample for air-drying overnight and enter the relevant customers details into our Laboratory Information System (LIMS). Once dried the samples are then prepared for extraction. For the majority of the methods we use for agricultural soil analysis where we are looking at plant available nutrients this means sieving or grinding the soils to pass a 2mm mesh.

Following this stage we then need to extract the nutrients of interest in the soil. The extractant used depends on the nutrient analysed but essentially the process is the same - we take a volume of soil and then add it to a volume of extracting solution and then shake the sample (for varied amounts of time depending on the nutrient) and then filter the extract.

We are then ready to analyse the extract and this is where a number of the instruments (AA & ICPs) that were mentioned previously come into play.

The results of these analyses are then transferred from the instruments to the LIMS and then the report is generated and sent out to the customer!

6. How do the results of these analyses help your clients?

The results of these analyses essentially allow the landowner (whether that be a farmer or perhaps amateur gardener growing his own veg in an allotment) to manage their soil as efficiently as possible for the maximum amount of productivity. So if we take the farmer for example the analysis of his soil will provide him with information that will allow him to apply the correct amount of fertiliser to the soil in order to grow his crop and will satisfy the requirements of various assurance schemes under which they may be required to grow the crop.

7. When people talk about "healthy" soils, what does that actually mean? What comprises a healthy soil?

I don't believe we have consensus across the soil science profession as to the exact definition of what this means but we quote the Food and Agricultural Organisation of the United Nations (FAO) definition in our handbook for the test which we believe sums up how we understand soil health:-

"the capacity of soil to function as a living system - healthy systems soils maintain a diverse community of soil organisms that help to control plant disease, insect and weed pests, to form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive repercussions for soil water and nutrient holding capacity, and ultimately improve crop production"

8. Finally, looking to the future, how could the way in which soils are analysed change, and is the outlook good for continued healthy soils across the globe?

My personal opinion is that we are perhaps going to see more remote testing technology being utilised which will not necessarily replace the type of work that is being carried out in our lab but may provide additional useful data over large areas of land for a relatively low price that will enable better land management.

The combination of this remote sensing information, weather data and soil and crop information when collated together is the new challenge. "Big Data" - capturing this information in the agricultural sector and utilising it in a way that provides practical on farm solutions that lead to more efficient production is where I can see there being some big advances over the next few years. We have already seen some very large companies in the States purchasing companies that capture this information in order to hopefully provide a solution to this challenge.

In terms of the outlook for continued healthy soils - I think the answer to this depends on the investment that governments around the world will commit to dealing with this issue. In the case of the UK due to austerity we have seen some fairly major cuts to DEFRA who ultimately are the agency responsible for this area and therefore there is limited resources to carry out focussing on this important topic so I would suggest the outlook is not that rosy.