

Sustainable agriculture for the future

March | Maart 2024

No 131

**Agri**  
About

[www.agriabout.com](http://www.agriabout.com)



## Soil Health

The role of microbes in restoring soils

Understanding soil health indicators

Agroecology for sustainability

Soils4Africa Project

Biochar to enhance soil fertility

*#SustainabilitySynergised*

PEOPLE | PLANET | PROFIT

SERVICE EXCELLENCE | ENTREPRENEURSHIP | EARNINGS | EMPLOYEES | ENVIRONMENT

*#IntegrityIntegrated*

**BKB**

The Trusted Home of Agriculture

# Soils4Africa Project - Ensuring repeatable soil monitoring in Africa.

Dr Nondumiso Sosibo  
ARC-NRE Soil, Climate and Water

**T**he Soils4Africa project is funded by the European Union (EU) under the Horizon 2020 initiative and facilitated by the International Soil and Information Centre (ISRIC) in the Netherlands, in collaboration with several partners across Africa and Europe.

The project provides an open access Soil Information System with selected soil quality indicators, soil survey metadata as well as soil survey and soil analysis methodology to ensure repeatability of soil monitoring across Africa. In so doing, the long-standing issue of fragmented soil data in Africa is resolved.

Most available soil data was collected during the 1960s-1980s and recently through the AfSIS project however, the different methodologies of soil sampling as well as soil analyses make harmonizing this data difficult. This negatively impacts assessing the status of the agricultural land in Africa and making informed management decisions as well as necessary interventions challenging.

A large group of field personnel carry out an Africa-wide campaign to collect soil samples at 20 000 agricultural sites across Africa (including about 10 000 subsoils, depending on the effective soil depths). A protocol for conducting fieldwork and collecting soil samples and a protocol for wet and spectral laboratory analyses is followed.

The Agricultural Research Council-NRE soil laboratory has been extended to include the spectrometer and other required facilities for spectral analysis. Staff at ARC-NRE received training on spectral analysis and spectral data handling from ICRAF. Approximately 30 000 soil samples will be sent to ARC-NRE for spectral analysis, with 20% of these

samples also sent for wet chemistry analysis at the ARC-NRE analytical laboratory. ARC-NRE implements a series of quality control measures in collaboration with its partners ICRAF (Kenya) and SGS (Hungary).

## **The actual process involved in Spectral and Wet chemistry analysis at ARC**

*Spectral analysis* consists of sample receiving from the different African countries, sorting and the verification process against the information in the project's Survey Data Management Tool (SDMT). Following the completion of these steps sample preparation for spectral analysis begins where the soil samples are milled using an agate pestle and mortar or a ball miller to smaller than 0.5 mm fineness. Once the samples are finely milled, they are carefully transferred into well-labelled sample containers. In the spectral laboratory, the samples are packed into the **Bruker Alpha II FTIR spectrometer** alpha cups, and they are ready for the mid infrared spectral analysis. Before the spectral analysis begins, the laboratory is set to 24°C temperature, the internal temperature and the relative humidity of the spectrometer is recorded in the log sheet (the relative humidity should not exceed 20% for the optimal sensitivity of the spectrometer). The instrument validation tests are run, and the amplitude and position readings are recorded, analysis in Opus Lab begins once a good signal above 12 500 units is recorded. After the spectral analysis is complete, the data is transferred to R studio for machine learning data processing.

*The wet chemistry analysis* includes particle size distribution, soil pH, exchangeable soil acidity, electrical conductivity, micronutrient availability, heavy metals, exchangeable bases, cation exchange capacity, total carbon, inorganic carbon, total nitrogen using mostly ARC-NRE accredited methods of soil analysis.



Figure 1: Countries involved in the Soils4Africa project and their logos.

It is important to have this project at the ARC in South Africa, as working with these multiple partners will expose the ARC analytical and research capabilities and open future collaborations with other African countries as well as international organisations.

**For more information:**

Dr Nondumiso Sosibo  
 E-mail: [SosiboN@arc.agric.za](mailto:SosiboN@arc.agric.za)  
 ARC-NRE Soil, Climate and Water



Figure 2: The sample sorting and verification process.



Figure 3: Sample preparation for spectral analysis using a Retsch MM400 mixer ball miller.