

Issue 70 • May/June 2024

Harvest SA

Securing South Africa's Food Resources

Plugging the leaks
Smart irrigation tips

Land reform

The benefit of Community
Private Partnerships

Sustainable soil health

Cultivating climate-adapted land-races

RSA R29.95

ISSN 2305-0551



9 772305 055108

South Africa's top international award winning agricultural magazine

Service through research

The Agricultural Research Council – Soil, Climate and Water has excelled over many years in fulfilling its responsibilities to agriculture

The ARC-Soil, Climate and Water (ARC-SCW) campus in Arcadia, Pretoria – now part of the ARC-Natural Resources and Engineering (ARC-NRE) division – has a long and proud history spanning over 120 years. It has developed from humble origins in 1902 as a services division of government with limited abilities into a leading research institute on the natural resources, that enjoys both national and international recognition.

The various campuses of the Agricultural Research Council (established in 1990) are

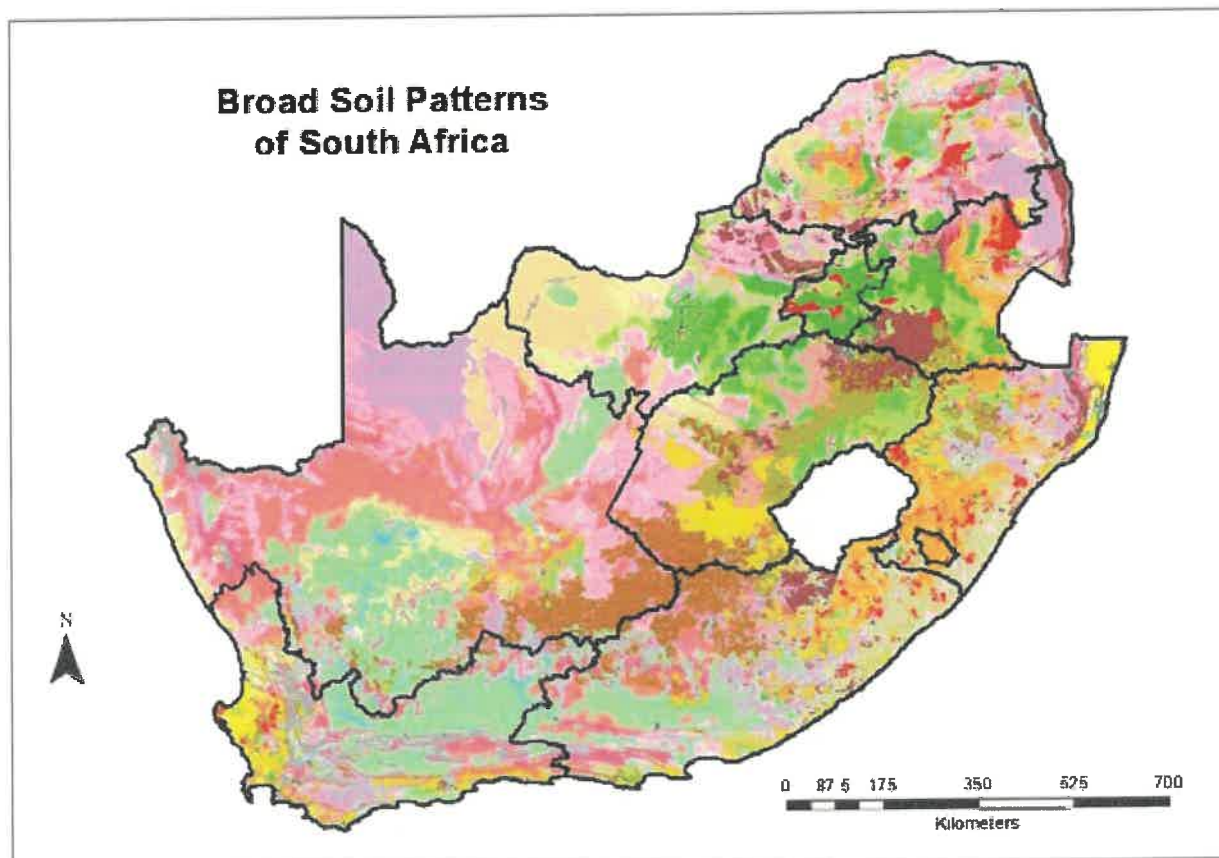
largely a continuation of the functions that originated and were developed by the Department of Agriculture. The ARC's vision of "Excellence in research and innovation for sustainable agricultural systems and economic development" reflects its core business and celebrates its unique role, acknowledging its position as the principal agricultural research institution in South Africa.

The research conducted by ARC-SCW over the years includes some significant highlights.

The role that ARC-SCW played in ensuring that South Africa is the only country in Africa with a complete geo-referenced soil

inventory of the whole country cannot be underestimated. The Land Type Survey, completed in 2002, was a systematic soil, climate and terrain survey of the whole of South Africa, published at 1:250 000 scale. During the early 1990s, the land type information was digitized using a geographic information system (GIS) so that digital information became the main product. In this way, basic soil pattern maps, as well as more advanced interpretations such as land capability or crop suitability, could be produced.

The ARC-SCW Analytical Services laboratories have continued to service farmers and the public with soil, water, plant and



Map showing broad soil patterns of South Africa derived from data collected for the Land Type Survey

specialist analyses. They participate in a number of quality control schemes as well as accreditation processes. The Water Lab was the first unit to be accredited by SANAS for several of its determinations, and the process of obtaining accreditation for various soil analyses is well underway. Due to advances in science and technology, techniques for analyzing agricultural soil have improved and now include the ability to take soil testing out of the conventional soil testing laboratory and bring it closer to the farmers via a mobile lab.

The EU-funded Soils4Africa project will help to resolve the longstanding issue of fragmented soil data in Africa. A large group of field personnel is undertaking an Africa-wide campaign to collect soil samples at 20 000 agricultural sites across the continent. Approximately 30 000 soil samples were sent to the ARC for spectral analysis, with 20% of these samples also undergoing wet chemistry analysis at the ARC-SCW analytical laboratories.

The Microbiology and Environmental Biotechnology Research Group at ARC-SCW was formed around a decade ago and utilizes both fundamental as well as applied microbiology and biotechnology approaches to address soil, climate and water challenges in the microbial sphere.

Through the implementation of participatory approaches, hundreds of farmers were trained by ARC-SCW researchers in more sustainable and profitable farming practices, initially as part of the Department of Agriculture's LandCare Programme and more recently via Conservation Agriculture (CA) technologies that have changed the agricultural landscape in South Africa. As a result of research on the relationships between soil, plants and water in dryland crop production, various rainwater harvesting and conservation technologies have been developed, tested and implemented for sustainable food production in rural communities in semi-arid areas of South Africa.

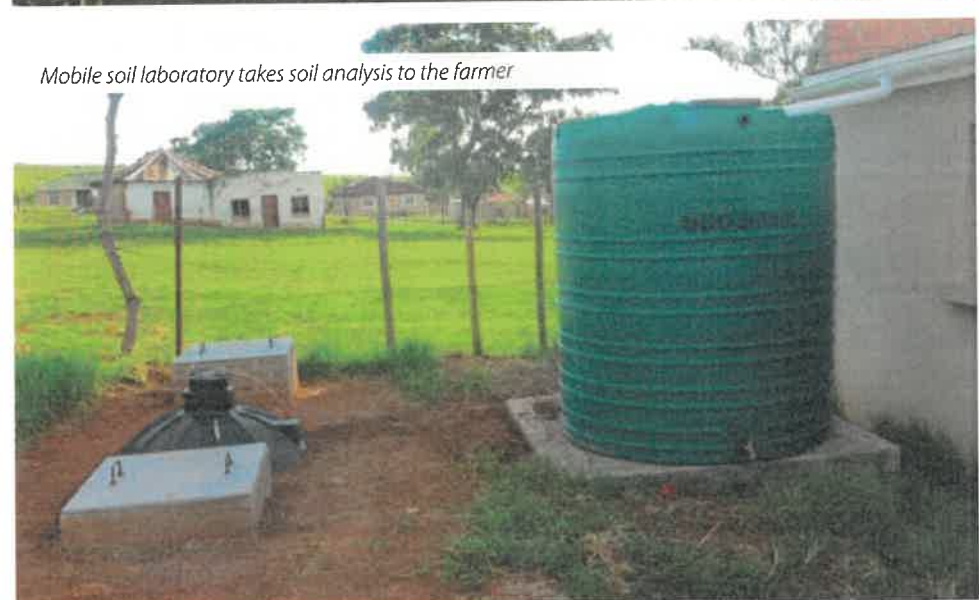
In 1970, the Department of Agriculture transferred the Agricultural Meteorology Research Unit to ARC-SCW, which then took over management of 79 mechanical weather stations. Over time, this network expanded to include 475 automatic weather stations. Currently, ARC-SCW also manages 138 stations for private clients, bringing the total number of weather stations in the Agrometeorological Monitoring Network to 613. Historically, data was received



Soil analysis conducted in the ARC-SCW Analytical Services laboratories



Mobile soil laboratory takes soil analysis to the farmer



Mobile soil laboratory takes soil analysis to the farmer



Automatic weather station



Drone technology applied in agriculture

via the postal service and had to be manually transcribed from paper into a database. Now, in contrast, data from the automatic weather stations is electronically collected every hour at the Opsroom in Pretoria. This data is then processed and made available to researchers and clients either online or upon direct request.

In 2007, ARC-SCW acquired a light aircraft (Jabiru J430) that was fitted with a multispectral digital camera system. Known as ARCEagle, it was used for low-level remote sensing for projects such as alien vegetation surveys and the summer and winter crop estimates. The application of remote sensing techniques in agriculture is continuously improving and under the Precision Agriculture theme, index-based crop insurance technologies are bundled to develop a product that can open doors for especially small-scale farmers to capitalization of farm ventures. A satellite/drone-based aerial survey provides an accurate picture of the farm, and analytics can be run on the imagery to automatically extract the growth metrics, allowing farmers to isolate areas of potential loss and take corrective action.

National Public Good Assets encompass the collection, storage, analysis and dissemination of natural resource information for use in sustainable land management. These facilities are funded by the Department of Science and Innovation and the Department of Agriculture, Land Reform and Rural Development. ARC-SCW is the custodian of the following National Assets:

- Soil information system
- Climate information network
- Coarse resolution satellite imagery database

In the years to come, the ARC-SCW campus of ARC-NRE will remain committed to the mission and strategic imperatives of the Agricultural Research Council. It will continue to promote the effective and efficient development and implementation of expertise and technology for sustainable natural resources management through research, technology development and transfer. ■

For more information:

Dr Garry Paterson

Research Team Manager: Soil Science

E-mail: garry@arc.agric.za