

# Study shows conditions required for cheaper soil carbon testing

## AT A GLANCE...

In the quest to reduce the cost of soil organic carbon measurement and increase certainty, researchers at the University of Sydney have put three methods to the test. The findings show a clear winner, that the Federal Government's target of \$3 per hectare is achievable and Australia has a unique competitive advantage in soil measurement.

**R**ESearchers from the University of Sydney have found the use of satellite imagery, combined with proximal sensing on the ground, is the best method to reduce the cost of soil organic carbon testing and improve certainty.

Soil scientist Dr Mario Fajardo, who led the research, said it is critical to reduce the uncertainty of the measurement itself to create a methodology that is both cheaper and scientifically sound.

"For carbon markets to work effectively, we need a soil carbon auditing method that maximises grower profitability and gives purchasers confidence that credits translate to actual carbon sequestration on the ground," Mario said.

### Three methods under the microscope

The research team used three farms managed by the University of Sydney, ranging in area from 70 hectares to about 2000 hectares, to test three methodologies:

- Traditional laboratory-tested soil samples;
- Proximal sensing, which typically involves equipment coming into direct contact with the soil to produce a reading on-site; and,
- A hybrid approach that combined proximal sensing and remote sensing (satellite imagery).

At \$120 a sample, the laboratory approach was four times the cost of the other two methods, which were both about \$30.

"In the community there is this idea of just using satellite imagery because it's almost free, it gives you 100 per cent coverage and you can see the distribution of whatever you are measuring such as where the trees are growing," Mario said.

"But it doesn't give you an exact idea of what's inside the soil. Soil is very difficult to assess which is why you need to dig a hole and it's why we're using proximal sensing as a complement to remote sensing. It's cheaper and faster than the lab test as you get the results right away."

Mario said the team developed a sampling program on the farms, along with an algorithm that combined the proximal and remote sensing data, to provide a level of certainty equivalent to laboratory testing.

"So that's a success by itself," he said. "It's also scalable because in Australia you have farms that can be six thousand hectares and can have similar soil types," Mario said.

"Sampling strategies depend on the variability of soils. So, the opportunity for Australia is that with these methods you can potentially save a lot of money."

### The recommendations

Mario said the technology requires further development with the testing locations expanded, given the research was undertaken on farms with known management strategies.

But, the researchers are confident the Federal Government's target of reducing soil carbon testing to \$3 per hectare is achievable on properties of greater than 1000 hectares that also have low variability.

They also recommended land managers devise a carbon sequestration plan before deciding to start the process of soil carbon accreditation as the assessment itself comes with a cost. ■



University of Sydney soil scientist, Dr Mario Fajardo says we need to reduce measurement uncertainty.



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