

Strategic organic matter builds soil carbon, boosts yields

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Potential improvement in crop yields and reduced greenhouse gas emissions are among the benefits of increased soil organic matter throughput, according to the findings of a project funded by growers and the Federal Government through the Grains Research and Development Corporation and the Victorian Department of Primary Industries.

The relationships between organic matter inputs and changes in soil properties were investigated in irrigated cropping regions of Victoria and New South Wales.

The trials involved the use of irrigated grain growers' paired paddocks, with each pair consisting of one paddock with a relatively higher organic matter throughput scenario and a paddock with a lower organic matter throughput scenario.

The results showed that in most of the paired paddocks the system with higher organic matter throughput produced yields equal to or higher than its adjacent paddock with lower throughput.

"It's not scientific proof, but this data nevertheless constitutes convincing evidence for growers," DPI researcher Dr Peter Fisher said.

Dr Fisher said the project aimed to address growers' concerns about declining soil structure resulting from continuous cropping.

"Soil structural decline under cropping systems is something that many farmers are familiar with," he said.

"Soil structural degradation probably remains, after salinity, the major threat to the sustainability of agricultural production.

"It is commonly associated with soil hardness, poor germination, restricted root growth, poor water infiltration, reduced water holding capacity and inevitably, reduced yields."

Dr Fisher said soil organic carbon was important in building and maintaining good soil structure, but a lack of understanding about the processes involved and a lack of experimental evidence in Australian conditions about the benefits had left advisers and agronomists wary about making recommendations to growers to increase organic matter inputs.

"This project has developed a better understanding of how varying organic matter inputs influences soil organic carbon, and how soil organic carbon influences other soil properties and ultimately crop performance," he said.

A key finding from the paired paddocks trial was that for every extra tonne per hectare of above-ground and below-ground organic matter – maintained on average for 10 years – the soil carbon percentage was found to be more than 0.2pc higher.

"This increase is greater than most carbon modelling suggests," Dr Fisher said.

"Most carbon modelling indicates that increasing soil carbon is a very slow process, taking many decades to achieve significant changes.

"For example, modelling a 2t/ha increase in organic matter input for the same conditions results in a change in soil carbon value of about 0.13pc after 20 years.

"In contrast, the relationship developed between change in organic matter input and change in soil carbon at the 13 paired paddocks in the trial, suggested that a 2t/ha increase in soil organic matter might result in approximately a 0.4pc change in carbon level after only 10 years.

"If a 0.2pc increase in soil carbon is achievable after, for example, 30 years of no stubble burning, then in Victoria where more 600,000ha of stubble were burnt annually according to the latest ABS statistics, over time the amount of extra carbon stored in the soil would be equivalent to a total of more than eight million tonnes of carbon dioxide."

GRDC

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