

BUILDING soil carbon was agriculture's solution to climate change and higher fertiliser prices without sacrificing productivity, Australian soil scientist Dr Christine Jones told Lake Bolac Eel Festival goers at the weekend. Through her Australian Soil Carbon Accreditation Scheme farmers increasing soil carbon could earn extra income from carbon credit payments.

At Lake Bolac Dr Jones said farmers could adapt to climate change by rebuilding new topsoil, through sowing crops into perennial pasture and/or using rotational grazing.

"Increased soil carbon is the solution to many of the current woes of agriculture" she said.

"Some people have built about 100 tonnes of carbon in their soil in four years so to build 20-25 tonnes of carbon per hectare is achievable when people change the way they manage the land."

Dr Jones said one tonne of soil carbon was equivalent to taking 3.67 tonnes of carbon dioxide out of the atmosphere. A tonne of sequestered carbon is worth \$91.75 under her ASCAS soil carbon accreditation scheme.

Some pasture-cropping farmers are sequestering 25-30 tonnes of carbon dioxide for every tonne of meat, wool and grain product they sell, she said.

The things needed to build new topsoil - carbon, nitrogen and water - come from the atmosphere, Dr Jones said.

The way grasses put carbon into soil is similar way to how trees make wood. Photosynthesis is the first step.

"It is difficult to build new topsoil without a permanent cover of perennial grasses"

Improving levels of humified soil carbon requires mycorrhizal fungi which take soluble carbon from plant roots deep into the soil, in return bringing back phosphorus, zinc and water.

This reduces reliance on expensive fertilisers while also making soil more resilient to cope with climate change, Dr Jones said.

"Since the industrial revolution in the 1850s we have lost about 476 gigatonnes (a gigatonne is a billion tonnes) of carbon from the world's soils due to inappropriate land management and around 270 gigatonnes from all of the burning of fossil fuels and industrial source emissions combined."

"Loss of carbon from soil has been the major contributor to increased carbon dioxide in the atmosphere for something like the last 8000 thousand years."

"We're still losing carbon from soil: we're still contributing to atmospheric pollution."

"Don't point your finger at the coal companies and say that they are the cause of all our problems," Dr Jones said.

"In Australia we have lost more carbon from our soils than all the coal companies combined have put into the air with their coal-fired power stations."

"And there has been a huge loss in terms of the productivity of the land," she added.

Dr Jones said that as landholders change their management and implement practices that build soil carbon the bioavailability of phosphorus, calcium, and many of the trace elements like boron, zinc and selenium increases. "The bioavailability of all of those things is linked to carbon."

She said carbon-rich soils also retain more water.

Pasture Cropping is a technique by which farmers have been able to successfully sow winter cereal crops into a summer-active perennial grass base.

The carbon-rich soils under the perennial grasses have high availability of nutrients and high water holding capacity.

"Despite what people at first believe, the crop actually grows better in the grasses than it does in bare ground."

These grasses build the resources for the crop. Where there is bare ground, soil carbon, soil water and nutrient bioavailability decline, she said.

"Every one per cent increase in carbon per square metre of soil holds about two buckets of extra water."

"Over a hectare of land it works out to about 170,000 litres of extra water than you would have been able to hold in a low carbon soil." Keeping rain where it falls reduces erosion, sedimentation in rivers and streams and improves productivity on the land. It also replenishes freshwater aquifers.

Woorndoo district farmers Mark and Julie Veale are keen to see south-west farmers rewarded for increasing the carbon content of their soil under the Australian Soil Carbon Accreditation Scheme.

The couple have been trialling various management methods, fertilisers and additives to increase the carbon content, biological activity and nutrient availability of their farm's soil.

Mr Veale said the work of Australian soil scientist Dr Christine Jones had the potential to help farmers store more water and nutrients in their soils, helping them to get through dry times.

"If we are able to hold more water in our soils that can then be given back to our plants in extended periods of dry - to me that's where our production gains can come from, by enhancing the natural system."

Mr Veale said he had done some trial work planting sorghum after a canola crop to help build soil carbon, to test weed interaction over summer and develop an "evergreen" system.

"We've also stumbled upon some native grass that we never knew existed that has stood up this summer in some cropping ground."

Mr Veale said he wanted to find out if the grass could fit in with the farm's cropping system, to develop a Pasture Cropping program.

But he is also interested in hearing from other farmers who also want to trial Pasture Cropping to build soil carbon. Mr Veale said a demonstration farm and trial work was needed to gain acceptance for Pasture Cropping.

Mr Veale believed Pasture Cropping could make money for farmers with potential input cost reductions while maintaining long-term crop yields.

Glenelg Hopkins Catchment Management Authority land health coordinator Richard Murphy said Dr Jones' presentation was very encouraging. Being able to manage soils through climate change and the move toward sustainable cropping was a top priority of the catchment management authority, he said.

"In our investment plan we've got projects that are specifically about managing soils with a view to being proactive towards impacts of climate change.