

# Qld scientists fight to save phosphorous

SCIENTISTS from Queensland have highlighted the work they are doing to combat phosphorous deficiency in soils, an emerging issue for broadacre grain cropping in northern Australia.

Indooroopilly-based principal DERM soil scientist, Dr Philip Moody, also principal agronomist DEEDI, Dr Mike Bell, from Kingaroy, both presented papers at the 19th World Congress of Soil Science in Brisbane this month.

Delegates were told the depletion of a non-renewable mined resource could threaten the long-term future of Australian agriculture since our phosphorous-deficient soils placed us in a more vulnerable position than many other countries.

Dr Moody's paper looked at how measuring techniques could be improved, plus detailed the latest application methods to apply phosphorous in the plant root zone with a view to maximising crop uptake, and to minimise any potential losses.

Dr Bell said potassium, like phosphorous, was an essential element for plant growth and could not be substituted with other elements.

It was also a non-renewable mined resource that could one day run out, thereby threatening broad-acre grain cropping in northern Australia which

also was affected by potassium and sulphur deficiencies.

Dr Bell's team says soil reserves of potassium and sulphur in grain cropping regions of Queensland and northern NSW are being depleted and the high costs associated with replacing these nutrients has the potential to make cropping unviable in these regions.

Meanwhile, Dr Eric Craswell from the Fenner School on Environment and Society, Australian National University, says the reason mined phosphate rocks are so critical to food production is there is no substitute for phosphorous.

"Phosphorus cannot be synthesised or manufactured in a laboratory and without sufficient phosphorus we cannot grow crops," he said.

The conference took place behind a backdrop that suggests global production of phosphorous fertilisers will peak in 2033 and will be one-third of that peak level by the end of the 21st century.

"Irrespective of when the peak occurs, exploitation of a non-renewable resource such as phosphate rock will peak and prices will increase as it becomes more scarce," Dr Craswell said.



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## Australian soils especially vulnerable to climate change

MAJOR changes are required in land management to prevent the 60 percent of Australia's land earmarked for agriculture from shrinking.

A keynote speaker at a major soils conference in Brisbane warned how this country's mostly infertile and fragile soils made the nation's agriculture industry particularly vulnerable to climate change.

Director of the CSIRO climate adaptation flagship, Dr Andrew Ash, said: "Overall, agricultural productivity in Australia will be negatively impacted by climate change through temperature increases and declining water availability, particularly in irrigation areas in southern Australia.

"Developing appropriate adaptation responses can significantly reduce the negative impacts of climate change but there will be limits to adaptation that we don't yet fully understand," Dr Ash added.

The CSIRO says necessary adaptation

responses will range from incremental changes in management, and adoption of new technologies to cope with some of the change, to more transformational changes to agricultural systems and land use.

Executive director of the Climate Change Institute at Australian National University, Dr Will Steffen, underscored the point that soils should receive more emphasis in climate change research because they played a critical role in the functioning of the earth system.

"Soils modulate the atmospheric-land exchange and storage of carbon dioxide and are the repository for large quantities of methane, another important greenhouse gas," he said.

Dr Steffen said there should be a renewed global-scale research effort on soils, their role in the functioning of the Earth System, and their modification by human activities.

## Saving soil carbon made easier

FARMERS, planners and policy makers have a better understanding about the soil types and land management practices that can maximise soil carbon levels, following this month's Brisbane soils conference.

CSIRO scientist Dr Jeffrey Baldock, currently coordinating the national Soil Carbon Research Program, is measuring the carbon content of Australia's agricultural soils, identifying farming practices that conserve and increase soil carbon.

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The aim is to detail the potential rate and magnitude of carbon that can be captured through soil carbon sequestration — a process designed to remove carbon from the atmosphere to deposit it in a reservoir.

Delegates to the 19th World Congress of Soil Science also held discussions on the benefits and risks of biochar, as well as the soil carbon research being undertaken in New Zealand.



Bxd biology being applied in front of a Kelly chain. The Bxd was applied to a wheat crop in the Liverpool Plains in 2009 in strips, whereas the whole field was manured and Kelly chained.

## In-ground composting saves time – and money

**I**N-GROUND composting is said to be delivering significant savings in time and money for farmers across eastern Australia, according to Shane Fitzgerald from Total Grower Services.

Total Grower Services is the Australian distributor for BFA approved and registered Petrik Wholefood Systems.

In-ground composting involves spreading manure, as many growers already do, and then applying Petrik Evergreen or Bxd biology as a spray before light incorporation. The incorporation assists in the composting, but is also required for the survival of the biological components which will not persist on the soil's surface. Significant results have been achieved with manure rates as low as 2 tonnes/ha.

The process creates similar compounds to those in compost. The ultimate objective is humus creation which is what provides most of the benefits to the crop, although the N, P and K in the manure help with this as well. The same practice can be applied to a green manure crop, although most growers do not have the water required to grow these.

Mr Fitzgerald said that in addition to applications with a Kelly chain they have also sprayed in front of the planter and "tickled the biology in" with the tines of the planter.

"We use in ground composting in many crops from banana and papaya to sorghum and wheat," Mr Fitzgerald said.

"The process has been approved by the BFA as organic producers are not allowed to use raw manure and can also be referred to as sheet composting."

Substantial savings in time and money compared to conventional composting are achieved through the handling of the manure to make compost which is usually around a six week job.

Many growers buy in straw to add to the

manure to balance the C:N ratio.

"By in-ground composting we use the carbon in the fields.

"The pile will usually need to be turned about 10 times through the composting process which requires equipment and a compost turner to do properly and on top of this you end up with slightly more than half of the volume you started with.

Raw manure is usually available for approximately \$25-\$40/tonne, and compost generally retails for \$150/t. Both will incur transport and spreading costs.

Where windrow composting is used Total Grower Services also has a specific Petrik biology to work in those temperatures and carbon levels. Windrow composting is usually required for crops where food safety requirements prevent the use of raw manure, such as lettuce or where the aim is to decompose elements such as weed seeds first. Compost is also useful in place of manure for specific crop stages where the nitrogen release from raw manure is undesirable.

"In-ground composting is our preference however for a few reasons, you get more of the N, P and K and carbon to the soil, as you do not lose volume through composting," Mr Fitzgerald said.

"The soil if seeded with the correct biology will still produce humic and fulvic acids from the manure which will become humus, these humic compounds produced by in-ground composting, however will be those required by your native biology to allow it to proliferate.

"Most of these core biology systems are still in soils; however, they are restricted by the lack of humus. When we talk about carbon loss from soils we often do not consider the real problem which is humus loss."



This aerial picture shows the strips where the Bxd was applied. The average increase in yield in the bottom two strips was 25 percent. The product cost was \$35/ha, including GST.