

# [***Managing soil health for best production starts with adequate testing***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6BH5-G0R1-JD34-V15S-00000-00&context=1516831)

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**Body**

Tests to help manage acidity and phosphorus levels in ***soils*** are readily available to growers to help maintain productive systems but growers are being urged to utilise multiple tests, to gain an accurate, overall picture of ***soil health***.

Adequate ***soil*** management can be challenging but SARDI research scientist Andrew Harding believed through the use of paddock pH mapping and regular ***soil*** testing, growers could ensure out of balance levels did not impact crop or pasture productivity.

"Acidic ***soils*** is an increasing problem in SA and more than 3 million hectares are prone to acid ***soils***. This number is likely to increase to 4m ha in the next few decades," Mr Harding said.

"When ***soil*** pH falls below 5.5, it can really affect the potential production of crops and pastures and at the moment, production loss is at about $88m per year."

A survey revealed, ***soil*** acidity is affecting paddocks across KI, Adelaide Hills, Mid North and Lower Eyre Peninsula, but additional ***soil*** mapping and testing revealed the Adelaide Plains, Yorke Peninsula and parts of the Mallee, were also greatly affected.

"It is becoming a big, widespread issue," Mr Harding said.

He said one of the main causes was a high use of ammonium-based nitrogen fertilisers and nitrate leeching.

"Acidic ***soils*** reduce the development of calcium, magnesium, potassium and phosphorus to plants and molybdenum, which is important for nodulation of legumes," he said.

"When acidic ***soils*** are present, 'moly' levels begin to drop off quite quickly and it also decreases nitrogen mineralisation."

When ***soil*** pH drops below 4.8 it begins to let aluminium into the system and ***soil*** solution. It can become quite toxic and burn off plant roots.

It causes plants to reduce water in-take and nutrients, and when it is critically low, plant roots are short and stunted from aluminium toxicity.

A survey in 2011 and 2013, looked at 100 paddocks at random in the Mid North, to measure ***soil*** pH.

In the zero to 10 centimetre surface sample, 24 per cent of paddocks had a pH of 5 to 5.4 and 28pc had a pH less than 5.

In the 10 to 20cm layer, 13pc had a pH of 4.5 to 4.9 and 3pc had a pH less than 4.4.

Mr Harding said this showed acidity issues were not just in the top ***soil*** but also, in sub-surface layer.

The core issue according to Mr Harding was durum wheat, barley, lentils, faba beans, canola, chickpeas and lucerne crops, were all very sensitive to acidic ***soils***.

"They all seem to be fairly intolerant to aluminium toxicity, too," he said.

But, some bread wheats can be fairly tolerant, as can ryegrass, and oats, triticale and lupins.

"If you have sensitive crop growing not very well, you may have a dominance of rye grass coming into the system," Mr Harding said.

A recent paddock pH map example also showed the extreme variation in ***soil*** acidity.

It had a range of pH levels from 4.5 to 8.4, which means a range of four pH units within one paddock.

"That is a huge variation, so it is important for farmers to be aware of this," Mr Harding said.

"The key to these maps, is then a lime prescription map shows how much is required for variable rate spreading."

How much lime to apply also depends on ***soil*** type.

In a sandy ***soil***, 2t/ha will raise pH by one unit, while sandy loam require 3t/ha and about 4t/ha for loam to clay loam.

When it comes to phosphorus levels, in SA, it has been historically quite low, according to Mr Harding.

How much phosphorus to apply in a paddock is also dependent on ***soil*** type and Mr Harding urged growers to make use of multiple tests which are available to accurately measure it.

"One test measures the extractable phosphorus in the ***soil*** but it does not tell us how much is available to the plants," Mr Harding said.

"Another test measures the amount of input tie-up and leeching potential. Phosphorus can be tied up with aluminium in acidic ***soils*** and with high carbonate in alkaline ***soils***. When you have this, extra phosphorus is required."

A newer test also measures available phosphorus to the plant.

For a non-calcareous ***soil***, phosphorus levels should be about 30 to 40 parts per million, calcareous should be 35 to 45 and according to Mr Harding, most ***soils*** in the Mid North have a pretty good history of phosphorus levels.

"But, it really needs to be maintained. For every tonne of wheat removed, you need to replace that by about 3 kilograms of phosphorus. So, if you take 4t, it needs to be replaced with about 12kg of phosphorus as a maintenance rate," Mr Harding said.

"Anything above 73 for wheat, shows the phosphorus is readily available to the plant and anything above 100, means it is highly available to plants."

Mr Harding also said, in sandy ***soils***, any measurement below or well below 73, most likely meant leeching.

He also touched on the role of nitrogen impacting ***soil health***.

"Nitrogen application is one of the hardest to estimate for best plant growth, yield and protein," Mr Harding said.

"But, too much nitrogen, could lead to nitrate leeching which then leads to ***soil*** acidification."

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