

How You Can Manage Sub-surface Acidity?

Some indicators that acidity may be a problem for you are;

- A soil test indicating your soil is of low pH
- Uneven growth of plant species
- Poor nodulation of legumes
- An increase in acid tolerant weeds e.g. sorrel
- Poor establishment of sensitive species such as lucerne, phalaris, medics, barley and canola
- The formation of an organic mat in the surface layer
- Stunted root growth
- Declining water use efficiency

How can you manage sub-surface acidity?

Soil acidity is treated by adding lime or similar alkaline materials to the soil.

The main sources of liming material in the South East are;

- Agricultural lime
- Dolomite
- Clays of higher pH
- Irrigation water

There are many methods of applying alkaline materials to your soil. The methods supported by this project include (but are not limited to):

Surface Liming Only

This method involves broadcast spreading of lime material over your paddock.

The first step to a regular liming program is to test your soil, and to set up regular testing of your paddocks every five to ten years.

Once tested, you will know your paddock's current pH level, and you can set a pH target that you would like to attain. The lower the pH, the more lime is required to recover the soil to ideal levels.

Things to be aware of:

- If you have a significant sub-surface acidity problem, then regular liming can correct the problem, however this is a long term approach to fixing your problem. In general in the mid-South East rainfall zone it will take approximately 20 years to increase the pH by 1 unit in the sub-surface.
- Be aware that high application rates can induce manganese deficiencies on sandy soils. This means that lime should not be applied above 2 t/ha in a year on sands.
- The surface pH needs to be maintained at a higher level than normally targeted if sufficient lime is to be available to move into the subsurface layer.

Clay Spreading or Delving and incorporation to at least 20 cm

Clay spreading and delving began in the South East as an attempt to address issues of water repellence.

Some people with sub-surface acidity issues are considering clay spreading and delving as a way to mix acid and alkaline soil, thus creating a soil change. By following with incorporation (e.g. discs, plough), the aim is to mix the soil more thoroughly in the top 20 cm. It is very important that you check to see if your clay is suitable before considering this method.

Things to be aware of;

- By using these methods a significant change in your soil pH should be seen within a year, provided the clay has a sufficiently high pH.
- There is an inherent danger of compaction in this method on loamy and clay soils, so significant traffic control on paddocks is imperative following the process, especially when the soil is moist.
- There has been very little research into applying clay to loamy surfaced soil. Some unforeseen side effects may occur. These may include surface sealing and hard setting.



Liming and Clay Spreading or Delving and incorporation to at least 20cm

This method is the same as above but includes the broadcast spreading of lime on the surface prior to spreading or delving.

Delving has the advantage of getting lime to a greater depth than other methods. Generally lime does not easily move sideways in the soil profile. The incorporation to at least 20cm will then allow the lime to be sufficiently mixed into the soil.

Surface Liming and Incorporation

Broadcast spreading of lime and mechanical incorporation into the top 10cm of the soil profile.

This method involves broadcast spreading of lime then incorporating it to approximately 10cm using a plough or discs.

The idea behind it is that if you mix the lime into the top part of the soil then you will reduce the distance that the lime has to move to get into your sub-surface soil.

Things to be aware of:

- It is expected that the lime will take approximately 15 years to get to a depth of 20cm by using this method.
- The surface soil pH needs to be maintained at a higher level than normally targeted, if sufficient lime is to be available to move into the subsurface layer.

Lime and Slotting

This technique is incorporation of lime into the top and sub-surface soil via ripping or slotting to at least 20cm. A tined implement with the capability to drop or inject agricultural lime directly behind the tines is used to get the lime to depth in the soil.

The tines must reach at least 20cm in depth below the soil surface. This allows the characteristics of the soil within the slot to be changed quite effectively. However, the degree to which the tined implement improves the rest of the soil depends on the spacing between the incorporating tines. Lime does not tend to move easily out of the slotted area and so may not always have the desired effect on the soil in between.

It is best to seek professional advice on what system is right for your soil. This could be different on different parts of your property.

Things to be aware of:

- The results of this treatment will be seen within a year. However mostly only in those parts of the soil where the lime has been placed.
- There is an inherent danger of compaction for this method on loamy and clay soils, so significant traffic control on paddocks is imperative following the process especially when the soil is moist

Lime and Complete Mix

This is incorporating lime more thoroughly through mechanical mixing via spading and/or rotary hoeing to at least 20 cm.

This is considered a complete incorporation method which aims to thoroughly mix the soil, to the desired depth.

A spading machine or large rotary hoe can potentially mix spread lime to the target depth. The spading machine works similarly to the rotary hoe but with slower revolutions.

Things to be aware of:

- The results of this treatment will be seen within a year.
- There is an inherent danger of compaction for this method on loamy and clay soils, so significant traffic control on paddocks is imperative following the process especially when the soil is moist.
- The mixing process will dilute surface soil organic matter and nutrients.

Irrigation

Irrigation water in the South East contains salts which can be used to neutralise acid soils. Alkaline salts contained in the irrigation water can have an equivalent neutralising effect to applying lime. Following a test of the irrigation water, landholders will be able to determine how much water needs to be applied to achieve the pH target required. Irrigation water can change the pH of the sub surface very quickly, with the pH target being achievable within the first year.

A number of different methods can be used to spread water on your soils but you will need to comply with current irrigation regulations to do this.

Upon reaching the target pH, irrigation can be continued if desired and this will maintain the soil at a higher pH, or potentially irrigation could be discontinued and replaced by an annual surface liming program.



Things to be aware of:

- An irrigation licence is required and you will need to comply with the current regulations related to irrigating on your property.
- You should be able to reach your target pH change within the first 12 months
- Irrigation will change your soil chemistry particularly relating to soil salinity and sodicity, and landholders should seek professional advice in relation to these issues if they require further information.

If you are interested in finding out more please contact Natural Resources South East, Land Management Adviser by phone on 08 8735 1177 or dewnr.naturalresources@sa.gov.au or visit www.naturalresources.sa.gov.au/southeast

An annual surface liming program and good fertiliser management are essential to counteract the ongoing acidification effects of high level production.

Even if you decide to do other management options (e.g. clay spreading, spading etc) to improve your pH, a regular follow up liming program is important to ensure that the problem does not return.

