

Choosing a lime - What should I consider

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Introduction

Neutralising value (NV), Effective Neutralising Value (ENV), calcium carbonate and fineness are all frequently mentioned factors used to compare and select lime products. But which factors should you consider and when?

This fact sheet discusses why NV is the most accurate measure to use, why ENV is not always reported in Victoria and what factors are important if you are purchasing lime.

Neutralising value (NV)

NV is the ability of the lime to neutralise acidity. Pure calcium carbonate (or pure limestone) is taken as the standard with an NV of 100%. The higher the NV, the more pure the product is. Lime products sold in Victoria commonly have an NV of 80 to 90%. Some products can exceed 100% if containing appreciable amounts of magnesium carbonate and/or burnt lime.

Fineness

The finer a lime product is the greater the surface area for the neutralising chemical reactions to occur. Therefore the lime reduces soil acidity more quickly.

Lime products are sieved and the percentage of particles retained from one millimetre (mm) sieving is used to indicate their fineness. Victorian limes range in fineness, some with particle sizes all less than one mm. Others can have up to 30% of their particle size exceeding one mm.

Effective Neutralising Value (ENV)

The ENV of a lime product considers the purity (Neutralising Value), as well as the particle size or fineness. An ENV of a lime product is calculated based on the sum of its percentage of particle sizes (fine,

medium and large) and their respective Neutralising Values.

ENV was once promoted as the preferred measure to use in choosing a lime and it was legislated by the Fertiliser Act (1995) to be reported on accompanying product information sheets. This requirement was withdrawn based on advice by the Victorian Limestone Producers Association (VLPA) that NV was a sufficient measure of quality for the majority of "soft lime" products found in Victoria and the additional costs of also testing ENV where not necessary.

In Victoria 90% of lime products sold are referred to as soft limes. Soft limes are a type of softer more porous limestone that can be excavated directly from the quarry whilst hard limes are crystalline limestone that requires mining using explosives. Two common hard limes used in Victoria are from Buchan and Lilydale. Both soft and hard limestones require processing and crushing.

Comparing the ENV for a soft lime versus a hard lime can be misleading. The particle sizes of soft limes by weight because of their porosity tend to be coarser than in hard limes. So when sieved to assess ENV they will often have a lower ENV compared with a hard lime because they are coarser. Yet a soft lime breaks down more easily in the soil when exposed to an acidic environment.

Calcium and Magnesium

Calcium and magnesium percentages are reported on the lime product label as they are important nutrients for plants, soil structure and animal health.

Most agricultural limestones are calcium carbonate. Dolomite or a Dolomitic limestone is a naturally occurring blend of magnesium carbonate and calcium carbonate. Magnesite is magnesium

carbonate with very little calcium carbonate.

Dolomite is not as soluble as calcium carbonate limestone and will not quickly act to ameliorate soil acidity. This is not a hardness issue, just based on the solubility of magnesium carbonate versus calcium carbonate as an intrinsic chemical property. It will still break down, but at a slower rate so fineness is more important to release the magnesium ions at a more rapid rate.

Sometimes coastal soils or soils that have been frequently limed may have a high percentage of calcium cations as part of their cation exchange capacity (>85%) yet still have high soil acidity. Putting on more lime might exacerbate this further increasing the calcium percentage at the expense of magnesium. There is a concern that when this occurs it might make grazing livestock more prone to magnesium deficiency complaints such as grass tetany.

Livestock health issues are best diagnosed through blood testing rather than through soil or plant tissue analysis. Dolomite or other magnesium containing materials might be useful if there is both a soil magnesium deficiency and an acidity issue.

Carbonate, oxide and hydroxide

The carbonate, oxide or hydroxide component of Calcium or Magnesium is what reacts with excess hydrogen ions in the soil to reduce soil pH.

Calcium oxide is referred to as burnt lime which has been manufactured under high temperatures within a kiln. Burnt lime is used mainly in horticulture due to its ability to rapidly change pH.

Calcium hydroxide is also known as slaked lime. It is more expensive than agricultural lime due to it having a much higher capacity to rapidly neutralise acidity.

Moisture content

Moisture content is an important but often over looked measure of quality.

Victorian agricultural limes can vary in moisture content from less than 1% to more than 15%. Moisture can also vary according to seasonal conditions.

Moisture adds weight to the lime which you pay for in purchase and transport but provides no benefit for reducing soil acidity.

Cost

Apart from considering Neutralising Value, fineness and moisture content, the other important factor is the cost of the lime delivered and spread.

In summary, all of the following need to be considered when purchasing lime:

- Neutralising Value
- Fineness/particle sizing
- Moisture Content
- Freight
- Spreading

How to find out information about lime products

Ask your lime supplier for an information sheet so that you have access to lime quality information. The VLPA website www.vlpa.asn.au also contains lime test information from its member's products. The SFS website www.sfs.org.au contains information on lime response trials and soil acidity research.