

*N fixing break crops and pastures for high rainfall zone acid soils (GRDC DAN00191)*

## Lime quality

When the decision is made to apply lime to ameliorate acid soils, before choosing the product, compare the effectiveness of the lime products available and their value.

The two major factors that influence the effectiveness of the lime in increasing soil pH are its neutralising value and particle size (Fineness).

### Neutralising value

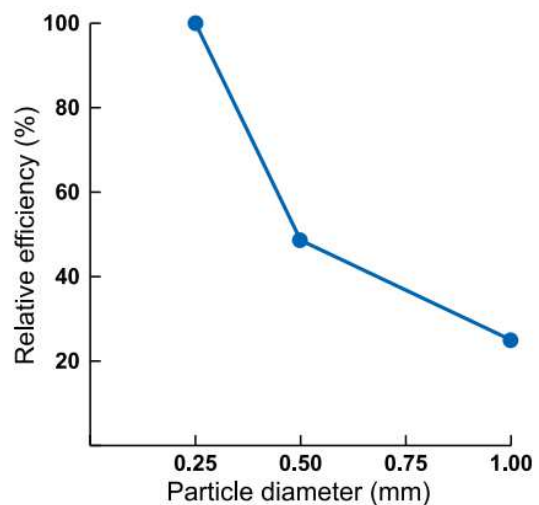
Neutralising value (NV) is a measure of the reactivity of a liming materials and its relative ability to change soil pH. Pure calcium carbonate (limestone) is used as the standard and has a neutralising value of 100. The NV of a product varies between

### Fineness

Particle size affects the time for the lime to react, neutralise acid and change soil pH. There is very little movement of lime down the profile in most loam or clay soils and the lime effect depends primarily on chemical reaction. Compared with coarse lime products fine grade lime materials:

- have greater surface area and react quickly and efficiently to neutralise the acid in the soil solution, and
- provide more even distribution in the soil.

Most agricultural lime sourced from NSW crushers is fine grade lime with a particle size of less than 250  $\mu\text{m}$ , i.e. at least 90% of the product will pass through a 250  $\mu\text{m}$  sieve. This is equivalent to the 0.25 mm particle size shown in Figure 1.



**Figure 1.** Particle size influences the relative efficiency of agricultural lime in changing soil pH (Source: Cregan et al, 1989)

Information on neutralising value and fineness should be available for all liming products at point of sale. This information can be used to compare the value of different liming materials by checking NV and fineness against the cost of the product as shown in the example on the next page.

Cartage and spreading costs can be a significant part of the final price and should be included in the calculations.

## Comparing the cost of liming products

**Comparative cost** = (Spread cost × 100) ÷ efficiency

**Efficiency** = (Fineness × Neutralising Value) ÷ 100

### Example:

| Lime A  | Lime B  |
|---|---|
| Fineness: 50  | Fineness: 90  |
| NV: 95  | NV: 99  |
| Cost of lime: \$85/tonne spread                       | Cost of lime: \$100/tonne spread                      |
| Efficiency: $(50 \times 95) \div 100 = 47.50$         | Efficiency: $(90 \times 95) \div 100 = 85.5$          |
| <b>Comparative cost:</b>                              | <b>Comparative cost:</b>                              |
| $(\$85 \times 100) \div 47.50 = \$179 / \text{tonne}$ | $(\$100 \times 100) \div 85.5 = \$117 / \text{tonne}$ |

Although the fine grade Lime B is more expensive on a per tonne basis than coarser Lime A, it is comparatively cheaper because it is more effective in neutralising acidity and will therefore provide a more rapid return on investment.

NOTE: There is likely to be variation in the moisture content of lime products. Ideal levels are 1 to 3% moisture, although tests for randomly collected samples delivered to farms have been as high as 15% moisture. High moisture levels can significantly increase cartage and spreading costs.

## Sources

Cregan PD, Hirth JR, Conyers MK (1989). Amelioration of soil acidity by liming and other amendments. In: *Soil Acidity and Plant Growth*. AD Robson (Ed.) Academic Press: Sydney, pp. 206-264.

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Access at: [http://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0007/167209/soil-acidity-liming.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/167209/soil-acidity-liming.pdf)

Ayres et al (2016) *Temperate perennial pasture establishment guide: Steps to ensure success* NSW Department of Primary Industries, Orange.

Access at: <http://www.dpi.nsw.gov.au/content/agriculture/pastures/pastures-and-rangelands/establishment/temperate-perennial-pasture-establishment-guide>

### More information

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