



# Sydney Environmental & Soil Laboratory

Specialists in Soil Chemistry, Agronomy  
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## Glossary of Horticultural Soil Additives

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## Glossary of Horticultural Soil Additives

The following is a glossary of common soil additives used in the Horticultural industry. While most people recognise these terms, there may still be some uncertainty about what the products are and exactly what they should be used for. This glossary aims to outline properties and applications of these products and should improve the understanding of why certain recommendations are made from soil tests and why they should be followed.

### pH Adjustment

- **Lime - Calcium carbonate (  $\text{CaCO}_3$  )**, used for raising the pH of acid soils thus reducing the toxicity of aluminium. Most suited to soils with low calcium ( low calcium: magnesium ratio). It is generally mined but can be a by product of industrial processes. This is the most common liming material used and contains impurities to varying degrees but normally has a liming value of 100%.
- **Dolomite - Calcium carbonate and magnesium carbonate (  $\text{CaCO}_3 + \text{MgCO}_3$  )** - A blend of calcium and magnesium carbonates used to raise the pH of acidic soils. Used when the calcium:magnesium ratio requires no adjustment as dolomite provides both calcium and magnesium and maintains the balance of the two. The proportion of calcium/magnesium in dolomite varies and liming value is typically 109%.
- **Calcium Oxide (  $\text{CaO}$  )** (burnt lime, quick lime) - calcium based compound stronger and more expensive than lime. Use to raise pH. Being soluble, it provides quicker pH adjustment but this makes it easier to raise the pH excessively due to its strength, and can be dangerous to use. Liming value typically 179%.
- **Calcium Hydroxide (  $\text{CaOH}$  )** ( builders lime, hydrated(slaked) lime) - higher liming value and more expensive than lime or dolomite but good if a pH rise is needed quickly. Being more soluble than lime it can be watered in. Use on acid soils. Liming value typically 135%.
- **Agricultural Sulphur (  $\text{S}$  )** - or elemental sulphur. A very strong acidification agent that will lower the pH of alkaline soils. It may take 6-8 weeks to fully react as it is a biologically mediated reaction. Soil must be moist and biologically active and warm weather will hasten the acidification.
- **Iron Sulphate (  $\text{FeSO}_4$  )** - an acidification agent but 8-9 times less acidifying than agricultural sulphur though faster to react. Good where alkaline soils are creating iron deficiency symptoms as it acidifies and provides iron. If a high degree of acidification is needed, agricultural sulphur is preferable as the high application rates of iron sulphate required can increase the salinity.

### Other Additives

- **Gypsum - Calcium sulphate (  $\text{CaSO}_4$  )** ( Clay breaker) - provides calcium to soils without affecting the pH. Good on some heavy clay soils as it improves soil structure and reduces erosion risk. Use on calcium deficient soils where no pH adjustment is required or clay subgrade prior to application of topsoil. Also good for flocculating clay from muddy water.  
**Epsom Salts - Magnesium sulphate (  $\text{MgSO}_4$  )** - improves magnesium levels in soils. Good for limey or calcium rich soils as these are often deficient in magnesium. Use sparingly as its highly soluble and may increase the salinity excessively. Also used in hydroponics.
- **Ammonium Nitrate (  $\text{NH}_4\text{NO}_3$  )** - (Nitram) - a good source of nitrogen but will acidify mixes or soils if used repeatedly. Not widely used as a fertiliser in landscaping as multi purpose NPK fertilisers are preferable. Use in woody or uncomposted mulch to minimise nitrogen drawdown at a rate of 500g/cubic metre or 50g/sqm after spreading. Rake through and water in well to minimise loss of nitrogen to the atmosphere.
- **Urea** - 46% nitrogen. A very concentrated source of nitrogen used to aid in composting and in potting mixes. Excessive use can create ammonium toxicity in susceptible plants. Will acidify soil with repeated use.

- **Superphosphate** - provides phosphorus and some calcium and sulphate to soil in a readily soluble form. Should not be applied to phosphorus sensitive species.
- **Rock Phosphate** - an organic, slow release form of phosphorus that is mined. Provides a good long term source of phosphorus due to its insolubility but should not be relied on as the sole source of phosphorus in high phosphorus demanding landscapes such as turf.
- **Low Phosphorus Fertilisers** - use as a source of nitrogen, potassium and sulphate on phosphorus sensitive or native species. Aim for a phosphorus content of <2%. Also good when over zealous fertilising has raised P levels excessively as it supplies other nutrients whilst allowing existing phosphorus levels to drop.
- **Iron Chelates** - foliar applications used to correct iron deficiencies by fortnightly applications through the growing season. Good if phosphorus sensitive species are suffering due to excessive phosphorus in soil - helps minimise phosphorus toxicity symptoms.

#### **Application Tips**

Additives are best applied prior to planting and cultivated through the surface 100-150mm of soil to allow proper incorporation. Application rates should be based on soil test results as problems can occur from excessive use. Soluble fertiliser can be broadcast over the surface of the soil or incorporated into backfill soil and watered in well.

As a minimum, a subgrade should be tested for pH, salinity and gypsum requirement. This allows the determination of the need for pH adjustment (lime, dolomite or agricultural sulphur), the likelihood of plantings being affected by salinity and whether the soil will respond to gypsum applications. Topsoil should be tested for these parameters with nutrient testing undertaken as an optional extra.