

Understanding Your Soil's Lime Requirements

Correcting soil pH is one of the key reasons that we apply lime, but there are other factors that should be considered. A basic understanding of these will help to determine your soils lime requirements and what to expect from lime applications.

Soil pH

Soil pH measures the concentration of hydrogen ions in the soil, the greater the concentration the more acidic. On the pH scale, a pH of 5.0 is ten times more acidic than a pH of 6.0. This is why a small change in pH can make such a difference to soil biology and nutrient availability. A measurement of soil pH can indicate that lime is required, but it does not by itself govern how much is required to correct a given pH. Factors that will influence lime's effectiveness include the soil characteristics (especially CEC), environment (rainfall etc), application and the lime itself (particle size, hardness and CaCO₃ content).

Cation Exchange Capacity (CEC)

Cation exchange capacity (CEC) measures the soil's ability to hold cations, including hydrogen (which drives pH), calcium, magnesium, potassium and sodium.

One of the key reasons that soils require differing amounts of lime to change the soil pH relates to the soil CEC and the "reserve" acidity that is contained by the soil. At a given soil pH, a soil with a higher CEC will normally require more lime to reach a given target pH than a soil with a lower CEC. High-CEC soils typically have more organic material and clay content, with a greater capacity to hold nutrients and better water-holding capacity than low CEC-soils.

pH Buffering

pH buffering, put simply, is a soil's ability to resist change in pH. When applying larger particles of lime to a high-CEC soil, change can be resisted to the extent that there is little effect on soil pH. This happens because the release of carbonate is slower than the soil's buffering capacity can counter it. In these situations particle size and availability are very important.

Particle Size

Particle size is a key determinant of a lime's effectiveness. The surface area and hence availability of lime is directly related to particle size. This explains why Optimise pelletised ultra-fine lime can be observed to have dramatic effects relative to heavier applications of aglime on some soils. Although a lower quantity of fine lime will be more rapidly utilised than a heavy application of aglime, it can be much more effective. Improved availability means a significant change can be bought about in soil solution, lifting pH and calcium availability, and reducing soluble aluminium levels in low-pH soils. This change in soil solution leads to improved nutrient availability (including phosphorus & sulphur), biological activity (including earthworm, bacteria & mycorrhizal fungi) and legume performance (including N-fixation).

Significant long-term changes in pH are easier to bring about in low-CEC soils. The cost of a heavy liming program can be cost prohibitive, particularly for high-CEC soils, but regular applications of fine lime can be utilised to great benefit. Rapid availability can overcome pH buffering in the short term to bring about improved biological activity and legume establishment. This will have longer-term benefits over and above any pH change that are ultimately more important for the future potential of your pastures.