Particle Size: Critical to Nutrient Availability

Take a look at the average lime outcrop or man-made limestone structure and you'll see that it is not breaking down in a hurry. A large block has only a small proportion of its mass exposed to the weather at any one time. Over the millennia the rock will gradually weather, taking very small amounts of calcium carbonate at a time and depositing it in the surrounding earth.

This is the very same rock that we apply to our soil. By grinding it to a finer particle we expose a greater proportion of lime, putting it into contact with soil water. This in turn allows the natural weathering process to occur at a much faster rate.

Each time the average particle diameter is halved the exposed surface area doubles – hence significant improvements in availability can be achieved by micronising limestone.

There is a school of thought that says that larger particles will last for longer. This is very true; the issue is that a small piece rock remaining in the soil for a long period is of little agronomic benefit. More important than longevity is the benefit that the liming product will have over its life, be it long or short. If longevity is all we require, then we would not take the trouble to process rock phosphate into superphosphate.

To be of benefit the liming material must breakdown and release calcium and carbonate into soil solution. It is important to understand the difference between altering soil solution as opposed to having product in the soil at large - after all, plants and microorganisms source their nutrients from soil solution. Larger particles can influence the bulk soil pH when tested in the lab, but on a paddock lime is of little benefit until it is broken down and available in soil solution.

By increasing the pH in soil solution we can improve the availability of key nutrients (including phosphorus & sulphur), enhance biological activity (including earthworm, bacteria & mycorrhizal fungi) and advance legume performance (and hence N-fixation). In very low pH soils (below 5.4) aluminum toxicity can restrict root development, especially in legumes. At these levels it is crucial to lift pH to take aluminum out of solution.

The same principles with respect to particle size apply to RPR and elemental sulphur. Both P & S can be applied as a soluble salt (ie superphosphate) but when applied in mineral forms (ie RPR & elemental-S) they must undergo a similar process whereby they gradually become available in solution over time. Reduction of particle size increases surface area and significantly improves availability.

The importance of particle size has been well established but application of finely-ground minerals has always been a problem. Optimise provides a solution to this issue by forming ultra-fine lime into a pellet that is both convenient to apply and breaks down easily. Optimise can also be made-to-order to incorporate sulphur, RPR and trace elements.

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