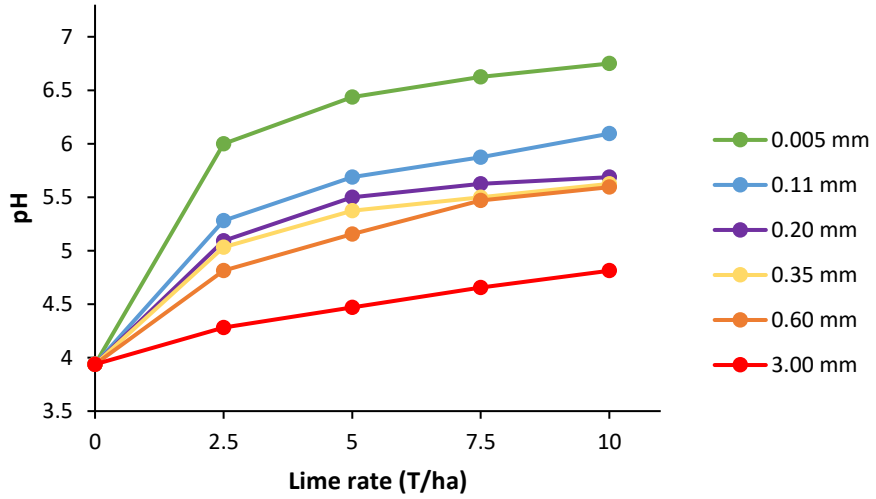
Effect of Particle Size on Lime Efficiency

A field experiment on wheat was conducted in Wagga Wagga by the Agricultural Research Institute over 4 years, to demonstrate the effect of particle size on acidic soil pH change.

It was found for all three application rates that the finer the particle size, the greater the increase in soil pH. This is due to the smaller particles having a greater combined surface area than the larger particles, resulting in more exposure to surrounding soil acids for significantly quicker pH changes. Ozcal has an average particle size of 0.02 mm whereas bulk lime particles can range from 0.075 to 5.0 mm.



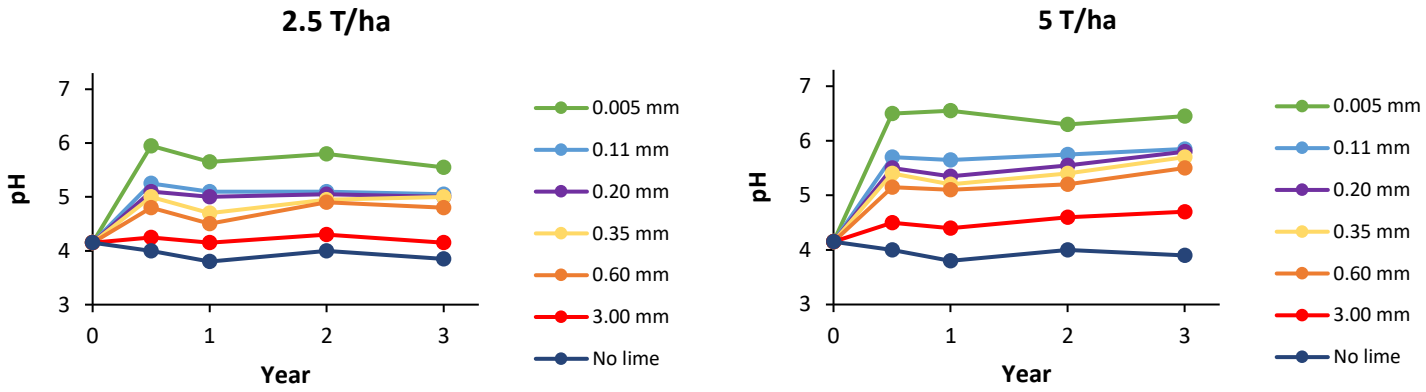
Lime efficiency is the ability of a liming material to raise the soil pH, and so is of great importance to the grower when it comes to determining value for money. While higher lime application rates result in an increase in effect, **the lower average particle sizes were shown in this study to have the greatest influence on soil pH change. This demonstrates that particle size is the key consideration for determining value for money to the grower.** Bulk lime is comprised of fine to coarse particles size ranges, and those with more coarse particles will be less efficient. Therefore, as Ozcal contains lime particles averaging 25 micron, higher rates of more coarse grade lime are required to achieve similar effects. Essentially it is the fine particles that increase pH, and by increasing application rates of coarse material you are simply increasing the amount of fine lime particles in the soil. It is important that growers consider lime particle sizes when it

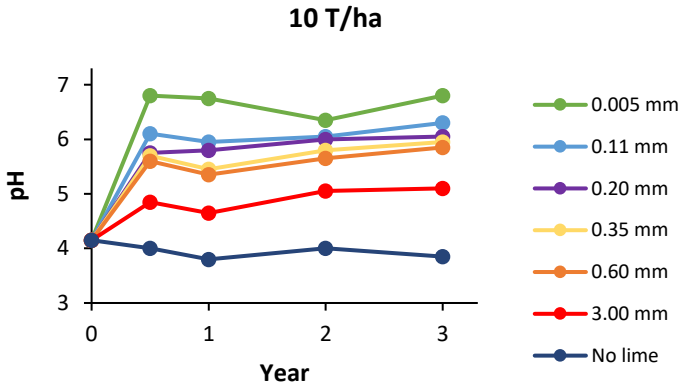
Application rate	Particle size (mm)					
(tonnes/ha)	3.00	0.60	0.35	0.20	0.11	0.005
2.5	9%	34%	47%	52%	58%	100%
5	13%	41%	53%	61%	64%	100%
10	29%	53%	55%	61%	73%	100%

Percentage of lime that was efficient in changing soil pH



Over time it was shown that there was a small decline in soil pH for finer particle sizes and a slight increase with coarser particle sizes, however **the lime containing the coarser particles never achieved the same pH level even after 3 years. This more immediate rate of pH change makes it a lot easier for the grower and agronomist to predict within season results, and the results are even shown to outlast coarse.**





The fine particle size required to achieve a rapid and required change in soil pH for optimal agricultural production is difficult to apply as it easily blows away and therefore, precision placement is not possible.

Nutrifert has overcome this issue by combining ultrafine lime particles (0.02 mm or 20 microns) into a stable granule that can be applied where it is required with great precision and once it comes into contact with moisture it breaks down and reacts quickly to achieve rapid increases in soil pH.

Reference and Acknowledgement

Scott B, Conyers K, Fisher R and Lill W (1992) Particle size determines the efficiency of calcitic limestone in amending acidic soil, 'Aust. J. Agric, Res., 43, 1175-85, NSW Agriculture, Agricultural Research Institute, Wagga Wagga.