

Blended fertilisers v homogenous granules

ONE OF the perpetual debates in horticultural circles is whether granulated homogenous fertilisers assure a more accurate application of a prescribed rate of nutrients than blends of similar analysis.

The science involved in blending fertilisers is little understood. There are, however, a number of factors to consider in getting the product manufactured to a certain quality and analysis.

From both an agronomic and handling perspective the physical form of a fertiliser is important. Commonly, issues such as 'caking', dustiness and poor particle distribution must be overcome in order to produce a product that is free flowing, not dusty and can withstand varying levels of humidity.

Particle size

Particle size is important because it directly influences where a fertiliser is to be used. However, there are other issues.

Materials of low water solubility must be present in a small particle size to ensure that plants can fully utilise them. Good examples of this are limestone, dolomite and sulphur.

Bulk blended fertilisers have a mesh size of 5-15 and it can be seen that a sulphur particle of this size is oxidised to SO_4 very slowly (see table).

For S to be oxidised to the plant-available SO_4 form even at moderate rates it must be of a very fine particle size.

In the case of lime, research has shown that coarse lime is relatively ineffective, demonstrating the fallacy of a commonly held belief that the larger lime particles impart a longer benefit because they dissolve more slowly. From a blending perspective particle size is also important to ensure a degree of uniformity.

Table: How particle size affects the rate of sulphur oxidation

Particle size (Meshes/inch)	% S oxidised	
	2 weeks	4 weeks
5-10	1	2
10-20	2	5
20-40	5	14
40-80	15	38
80-120	36	68
120-170	61	81
230	80	82

It has been found that materials for blending should agree in not only their upper and lower size limits but also should be reasonably similar in particle size distribution between these limits.

Segregation properties

When handling bulk fertilisers non-uniformity, referred to as segregation, may occur.

This is undesirable because this can affect the agronomic performance of the product and also make it impossible to obtain proper samples and meet analytical guarantees.

Segregation occurs when individual granules differ in their physical properties to such an extent that they respond differently to the mechanical disturbances caused by handling.

Particles of similar physical properties tend to congregate and so the homogeneity of the mix is lost.

Contrary to what is sometimes stated research has shown that particle size has the most influence on the likelihood of this occurring and that neither the shape nor density affects segregation to an important degree.

If all the particles in a fertiliser are of identical chemical composition but differing sizes, handling induces physical segregation but does not affect chemical uniformity and this is basically the situation that exists in a compound fertiliser such as Nitrophoska.

In contrast where granulation is

imperfect, smaller particles can differ in composition from larger ones and lead to segregation developing. Solutions to avoid this are better granulation or screening to narrower size ranges.

Granule hardness

Fertiliser granules should be hard enough to withstand normal handling without fracturing.

An assay of homogenous granules will almost always show little deviation among particles – but they will not be perfectly identical.

Nor do they have to be for an applicator to be certain the correct units of each element have been laid down.

Good granulation requires a degree of sophistication, engineering, and (usually) temperature control that only a few manufacturers have the volume and facilities to accomplish. Often, granulated homogenous fertilisers are more expensive than their blended counterparts.

Today, formulators of blended mixtures to our industry have the capability of providing uniformity of ingredients in both bagged and bulk shipments.

The reason is that they are able to purchase raw materials of similar size and density – or they have the means to grind and screen products to meet prescribed specifications.

In a study conducted just a few years ago by professor of turf science at University of Georgia, Dr Keith Karnock, there was very little difference in the rate of applied nutrients between quality blended turfgrass fertilisers and homogenous products.

Let your eye be the judge. When you look into a bag or bulk container of a blended fertiliser, if it appears to have good particle distribution, it will provide the same in application.

If segregation is obvious, there is cause for concern. ●