Mug up on magnesium to make sure you apply the right form

Jerry McHoul concludes his three-part series on magnesium by looking at sources of the nutrient

Many different forms of magnesium are available for use in agriculture, but the ones most commonly used as fertilisers consist of the carbonate form, the oxide form and the sulphate form. Each of these has very different properties which need to be understood before a decision can be made as to which form is suitable for a given situation.

The table below describes commonly used fertilisers, plus some more specialist magnesium fertilisers that can play a role in some horticultural applications.

Fertilisers: content and appearance

Product	Analysis MgO	Other	Form
ESTA Kieserite	25%	50% SO_3	Granular
Epso Top (bittersalts)	16%	32% SO_3	Crystalline powder
Magnesia-Kainit	5%	11% K_2O 10% SO_3 26% Na_2O	Granular
Calcined magnesite	≈80%		Granular/ powder
Dolomite or mag-lime	10-20%	$CaCO_3$	Granular/coarse powder
Magnesium hydroxide	35%		Powder (usually present in suspension)
Magnesium nitrate	16%	11% N	Powder

MAGNESIUM CARBONATE

(Mag-lime, Magnesian limestone, dolomite etc.)

Typically containing 15%-20% MgO, carbonate can be a relatively inexpensive source of magnesium and is often misused.

Mag-lime should only be used if there is a genuine need for pH correction in an acid soil and where Mg is required.

Several problems have arisen from the long-term use of Mg-lime as a liming agent that has led to very high Mg levels, an imbalance of cations in the soil and the result that potash availability becomes limited.

The main issue is that Mag-lime is mostly applied around the local areas in which it is quarried, which by nature are already naturally rich in magnesium.

MAGNESIUM OXIDE

(Calcined magnesite, calmag etc.)

Calcined magnesite is produced by heating dolomite to very high temperatures (calcining) which converts carbonate into the oxide form.

Many studies have been conducted into the suitability of Mg-Oxide as a fertiliser, which have produced the following conclusions:

- Large variations exist between product batches and this seems to be linked to the temperature of calcination.
- Availability is poor with values as low as 10%-20% Mg recovery after one year reported, particularly from nearly neutral or alkaline soils.
- Availability increases with fineness of grinding with the larger more spreadable product reported to be the least available.

MAGNESIUM HYDROXIDE

This is also used as a magnesium fertiliser, particularly in the preparation of suspension fertilisers. Magnesium hydroxide's solubility and properties are similar to those of the oxide form.

MAGNESIUM SULPHATE

Magnesium sulphate is also known as the mineral kieserite. The natural form of kieserite (eg ESTA Kieserite) is only found in a few mines in Europe where it was deposited with the evaporation of great seas millions of years ago.

Magnesium sulphate has the advantage that it is water soluble and is therefore unaffected by soil pH. Recovery values after one year have been reported at around 80-100%, so magnesium sulphate appears to be a very suitable source of available magnesium.

Two main forms are used, Kieserite, which typically contains 25% MgO + 50% SO_3 and Epsom salts (eg EpsoTop) which is the heptahydrated version with very rapid and high solubility for foliar use or for fertigation systems.

The table below illustrates the differences in solubility of the most common magnesium fertilisers.

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Solubility of Mg fertilisers

Mg source	Solubility in water (g/litre)
ESTA Kieserite	417.000
Magnesite ($MgCO_3$)	0.034
Calcined magnesite	0.0062
Magnesium hydroxide	0.009

Join the DEFRA funded fertility building crop project

A major project designed to help growers improve soil fertility has been launched by a consortium of research organisations.

Funded by DEFRA, the project is led by organic bodies, but it is intended that lessons learnt will also benefit conventional growers.

"Fertility building crops have always been crucial in organic rotations, but with the rising cost of nitrogen fertiliser they are attracting interest from conventional farmers too," says Francis Ryans, a soil scientist at HDRA Garden Organic, formerly the Henry Doubleday Research Association.

"The current range used in the UK is very limited – it's unusual to see anything other than red or white clover used – but we have preliminary evidence that other, less-known species, such as fenugreek, trefoil, medic, lupins or lucerne might perform well, but more research needs to be done."

As well as HDRA, other organisations involved include Warwick Horticultural Research Institute, Abacus organic associates, Elm Farm Research Centre and the Institute of Grassland and Environmental Research.

Initially the project will identify where there are gaps in knowledge and then identify what can be done to fill them.

Growers and advisers are invited to take part in the process by attending project meetings or trialling new techniques, either on a small-scale or a real-farm situation.

"The project will continue a trial comparing contrasting fertility building strategies over the next 10 years," explains Mr Ryans.

Anyone interested in getting involved in the project should contact Anton Rosenfield at HDRA Garden Organic by phoning 02476 303517.