Factors affecting sulphur supply

There are two main loss pathways for S which are gaseous losses and leaching losses.

Gaseous losses

In poorly aerated soils, sulphate can be converted by soil bacteria to hydrogen sulphide (a toxic gas that has a rotten-egg smell) or sulphur dioxide, which can be lost to the atmosphere. This is more common in soils that easily saturate and do not drain (heavy clays, compacted soils, low lying soils that accumulate water, inter-row puddling) and may be of particular concern where there is over-irrigation and when flood-irrigation is used. Sulphur is also lost during burning of sugarcane.

Leaching losses

Sulphate does not interact strongly with soil particles and will readily move through a soil, especially if the soil is free draining. This effect tends to be greater in sandy and low organic matter soils with low nutrient holding capacity and high free drainage.

Immobilisation and mineralisation

Like N, most of the S in a soil exists in the organic form (up to 90% in most soils where no fertiliser is recently applied). This is the main reason why high organic matter soils (i.e. N-category 3 and 4 soils) require less sulphur than low N-category soils. Soil micro-organisms are principally responsible for releasing S into the soil from the breakdown of organic matter (**mineralisation**). Assimilation of S by microorganisms is a less dominant process so typically does not result in the lock-up as observed in nitrogen.

Sulphur recommendations

Sulphur recommendations consider the organic matter status of the soil and soil test value. Soils with high organic matter tend to have better S supply than low organic matter soils. Thus sandy soils with low organic matter are more likely to require and respond to S fertilisation. Four categories, as used for N mineralisation potential, are also used for guiding sulphur requirements.

The soil test for S is based on the same anion exchange resin method used for phosphorus determination. The test measures readily available sulphate in the soil and provides an indication of the immediate supply of S from the crop. A threshold of **15 mg/L** is used to assess adequacy of soil supply. The table on page 3 serves as a general guideline to adjust S application rates.

▲ Regularly soil sample your soils to determine S availability. The FAS Agricultural Laboratory offers this test as part of their routine soils package.

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Available sulphur fertiliser product formulations

Source/product	S %	Other %	Notes
Gypsum ($CaSO_4$)	12-18	Ca:16-19	Suitable for of all soil types but may require additional Mg when applied to sandy soils.
Ammonium sulphate	23	N:21	Typically used as N fertiliser when S is required. Strongly acidifying.
Ammonium sulphate nitrate (ASN)	13	N:23	
Single super phosphate (SSP)	10	P:8-11 Ca:20-22	Typically used as P fertiliser but supplies S and Ca.
Epsom salt (magnesium sulphate)	12.4	Mg:9.6	Not most cost effective, but may be useful when Mg is needed.
Potassium magnesium sulphate	22	K:11 Mg:11	Not most cost effective, but may be useful when Mg and K are needed.
Elemental S	90 - 100	-	Strongly acidifying and difficult to handle and becomes corrosive. Typically used to acidify alkaline soils to increase P and micronutrient availability. Furrow application is mostly advised.

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