

# Sulphur for yield and quality

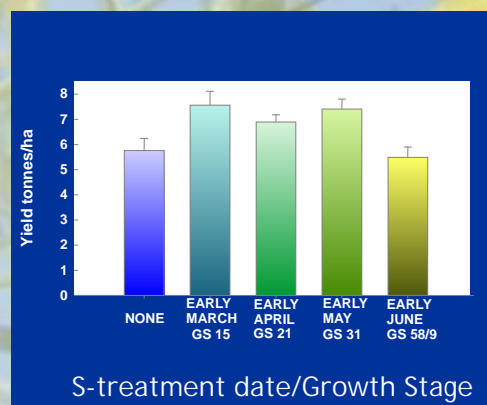
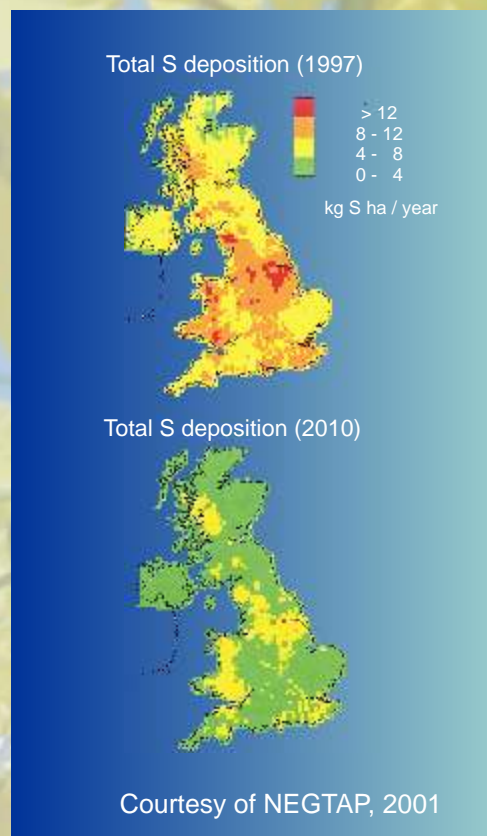


Risk of sulphur (S) deficiency is increasing:

Inputs of sulphur from the atmosphere have decreased markedly in recent years due to controls on air pollution, and will continue to decline for the foreseeable future (see maps). Using data for sulphur supply and crop need, we predict that more than 50% of the cereals area is now at risk of sulphur deficiency. For winter oilseed rape, the area is likely to be much larger. However, from the British Survey of Fertiliser Practice, it seems that many farmers are not using enough sulphur fertilisers. We recommend application of 20 kg S/ha (50 kg SO<sub>3</sub>) for cereals in potentially deficient areas, and a routine application of 30 kg S/ha (75 kg SO<sub>3</sub>) for all crops of winter oilseed rape.

Sulphur boosts yields:

Significant increases in grain yield due to addition of sulphur fertiliser have become common in recent years. The size of this increase for wheat depends on soil type and location, but is typically 5-25%. Yield responses are frequently seen when sulphate fertilisers are added at any time from tillering to early stem elongation. However, late application, for example at Growth Stage 58/9 (ear emergence) is often too late for yields to recover, although the concentration of sulphur in the grain can be increased.

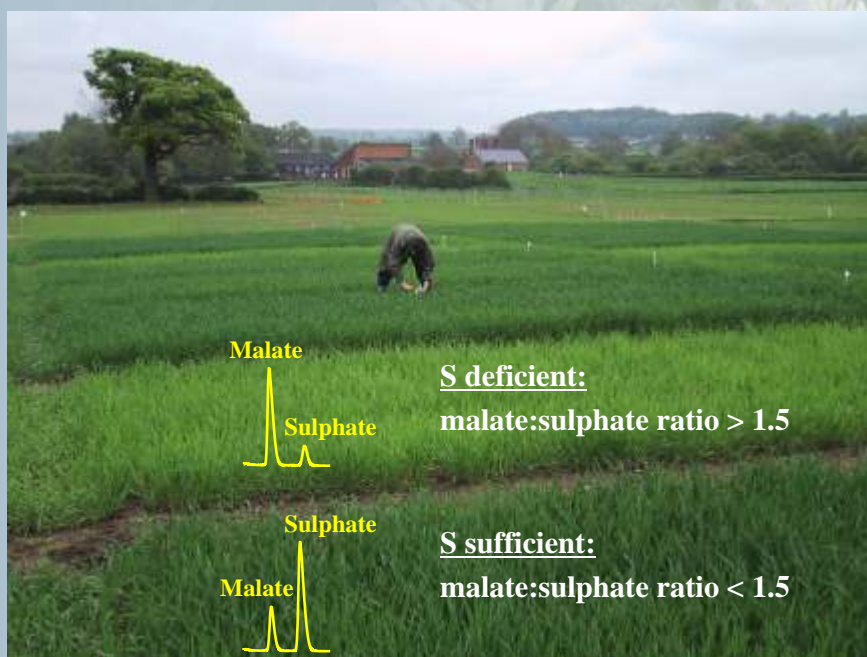


Sulphur deficiency in wheat also has an important effect on the composition of proteins in wheat grain, which are associated with increased extensibility of dough, resulting in increased loaf volume. We found significant yield increases due to S addition in 30% of field experiments with wheat during 1995-97. However, application of S increased loaf volume significantly in 60% of field experiments, so effects on quality are more frequent than those on yields, and both may have increased since 1997.



## Diagnosis of sulphur deficiency:

We recently showed that malate:sulphate ratio is a reliable indicator of sulphur deficiency. Malate is an organic acid occurring naturally in plants which maintains the charge and acidity balance within cells. Both malate and sulphate are measured in a single analysis by Ion Chromatograph. The test is more accurate than previously used indicators such as tissue nitrogen to sulphur ratio. The best timing for a malate:sulphate test is between late tillering and early stem elongation in cereals. The malate:sulphate ratio test is now commercially available.



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