Background

The yield of winter oilseed rape may show large responses to applied sulphur on deficient sites which now cover some 30% of the UK. Responses in the spring crop have been much less common. HGCA has funded several relevant projects led overall by Professor Steve McGrath of IACR Rothamsted, but involving ADAS, Newcastle University and SAC to complement work on cereals (Topic Sheet No. 1).

Winter oilseed rape

Trials were established to test combinations of levels of N and S in the crop years 1990/91, 1991/92 and 1992/93 on low glucosinolate varieties of oilseed rape. Sites were chosen because soil tests indicated that deficiency was likely. Yield responses ranged from 15% to 75% to added S in crops grown at nine out of 29 sites covering England and Scotland. Typical deficient soils were sandy or chalky.

Oilseed rape crops have a high demand for S, with approximately 16 kg of S required to produce each tonne of seed.

A risk prediction map (Figure 1) which takes into account soil type and likely deposition of S from the atmosphere has been devised to help farmers determine whether crops in Great Britain are likely to be at risk from S deficiency. But note this can only be a guide because the extent of sulphur deficiency is increasing year by year.

Figure 1. Risk of sulphur deficiency in winter oilseed rape

All Brassica species, including oilseed rape, contain glucosinolates which have toxic breakdown products. Low glucosinolate varieties bred to improve the acceptability of rapeseed for animal feed have only 10-20% of these compounds compared to older varieties. Unfortunately, if you apply S to remedy a deficiency on high glucosinolate varieties, there is a risk of increasing its content to
For winter crops:
Locate your farm on the sulphur deficiency risk map. If deficiency risk is high, have soil samples, taken in the spring, tested by an accredited NAMAS laboratory. Apply S in early spring, e.g. 80-120 kg/ha ammonium sulphate (to give 20-30 kg S/ha). Do not apply more than is necessary for yield.

For spring crops:
Follow the advice as for winter crops and apply S if necessary.

All crops:
Monitor plants for possible deficiency symptoms during spring and early summer. Fertiliser suppliers often quote the SO₃ content rather than the S content of their product. In calculating how much fertiliser to apply, always use the conversion factor - 15 kg S/ha = 37.5 kg SO₃/ha.

**Detecting and correcting deficiency**

Soil test results provide the basis for many decisions on S applications. Make sure that samples, taken from 30 cm or 60 cm depth in the spring, properly represent your soil type. Analytical results for S can vary considerably so only use a National Measurement and Accreditation Service laboratory.

Deficiency symptoms in Brassica crops are fairly easy to recognise, as long as nitrogen deficiency is also eliminated. By then, however, it may be too late to correct deficiency.

Like nitrogen, sulphur leaches easily, especially during the winter, in well-drained sandy soils and where rainfall is heavy. Apply ammonium sulphate (for S and N) or fine powdered forms of elemental S in the spring for an immediate response.

**Spring oilseed rape**

Eleven experiments on the spring crop were carried out in the 1995, 1996 and 1997 seasons at sites which seemed likely to be S-deficient on the basis of soil test results. Results were not as clear-cut as with the winter crop as there was a positive yield response in only one trial - a shallow chalk soil in 1996. The summers in the first two years were very dry. This probably largely explains the overall low yields of the crop grown, their low demand and lack of response to S.

Above an acceptable threshold level, 18 µmol/g of seed.

If less than 50 kg/ha of S is applied, which is at the top end of the range recommended in fertilizer regimes, the threshold should not be breached. Table 1 shows a greater response on S-deficient compared with S-sufficient sites. Therefore, do not apply more S than is required for maximum yield on these varieties.

**The future**

Many farmers in recent years have correctly applied S to S-deficient oilseed rape crops; others have applied it unnecessarily. This highlights the need for a reliable sap test on which to base spring fertiliser recommendations. Progress in an HGCA-funded R&D project on this topic is promising.

### Table 1. Effect of S on glucosinolate levels (µ mol/g) in winter oilseed rape

<table>
<thead>
<tr>
<th>S applied (kg/ha)</th>
<th>S-sufficient sites (20)</th>
<th>S-deficient sites (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15.2</td>
<td>9.7</td>
</tr>
<tr>
<td>50</td>
<td>17.1</td>
<td>19.8</td>
</tr>
</tbody>
</table>

**Further Information**

Project Reports: O 52, O 58, O 511, O 526

Ongoing projects: O 508/1/94, O 515/1/95, O 508/1/96

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