West Midlands development: fertilizers for the West Midlands

Department of Agriculture, Western Australia

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FERTILISERS FOR THE WEST MIDLANDS

FARMING the light lands of the West Midland area would be impossible without fertilisers. Most light land areas are inherently very low in phosphate and also require nitrogen. The nitrogen can come from fertiliser for cereal crops, or can be built up by growing appropriate legume pasture plants such as clovers and lupins.

Trace elements are also important and are normally applied with the initial superphosphate dressings.

Nitrogenous fertilisers are likely to give payable increases when used on cereal crops in the early years of development.

Phosphorus

For new land sown to cereal crops or pastures (if new land is immediately sown to pasture) the dressing of superphosphate should be at least 180 lb. per acre. Higher dressings are likely to be profitable on cereal crops, especially if nitrogen fertiliser and appropriate trace elements are also applied.

If successive cereal crops are grown in the early years, or if the land is planted to pasture after cereal crops, the rate of super should be around 150 to 180 lb. in the second, third and fourth years. Even higher rates are likely to be necessary on the deep white sands but rates may be somewhat lower on the yellow sands or sand over gravel. Very gravelly soils should receive at least 150 lb. per acre. This means that in the first four years, about 600 lb. of super will have been applied per acre.

In later years the annual super dressing may be reduced. It is probable however that the deep white sands and the very gravelly soils will continue to require relatively high annual dressings of about 120 lb. per acre for several years. On the more sandy soils over gravel, or on the yellow sands, it is believed that the annual rate may be reduced to 90 lb. after the total dressing has reached 1,000 lb. per acre.

Legume pastures

In the pasture establishment year the rate of super should not exceed 180 lb. per acre. Higher rates can reduce germination and nodulation of clover plants due to the physical contact of the inoculated seed with the fertiliser in the drill row. Suggested annual dressings of super on legume pastures are set out in the table below:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Phosphate history of paddock in lb. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–250</td>
</tr>
<tr>
<td>Sandy gravel</td>
<td>180</td>
</tr>
<tr>
<td>Sand over gravel, yellow sand</td>
<td>180</td>
</tr>
<tr>
<td>Deep white sand</td>
<td>180</td>
</tr>
</tbody>
</table>
Trace elements

While the trace element impurities in ordinary super, particularly zinc, are of considerable value, it is necessary to add trace elements during the early development of light land in the West Midlands. The coastal soils at Lancelin and extending northwards are particularly deficient and require special treatment.

Copper

Copper deficiency occurs in many soils, especially those with ironstone gravel in the plough layer. Cereals are most affected by this deficiency and yields can be increased by supplying bluestone at $2\frac{1}{2}$ to 5 lb. per acre. The recommended rate for the more gravelly soils is 5 lb. per acre. After one application at these rates no repeat application should be necessary. Since copper is essential for animal health, copper dressings are also necessary for pastures and should be applied early in the development period.

Zinc

Zinc deficiency can affect both cereals and pasture legumes. A dressing of $\frac{3}{8}$ lb. of zinc oxide per acre is sufficient for the deeper sands and $1\frac{1}{2}$ lb. per acre for the more gravelly types. Repeat applications should not be necessary because ordinary super contains enough zinc to replace that removed in farm produce.

Molybdenum

At Badgingarra Research Station molybdenum deficiency has been seen on lucerne and sub. clover pastures but not on wheat or oats. Molybdenum application may not always be essential in many areas of the West Midlands, but as the cost of applying molybdenum is only about 50 cents per acre, the risk of pasture failure caused by molybdenum deficiency makes such expenditure seem worthwhile. A single application of 2 oz. of molybdenum trioxide, or $2\frac{1}{2}$ oz. sodium molybdate per acre is all that is required.

Trace Element Mixtures

The copper and zinc applications needed depend on whether sandy or gravelly soil is being treated. There are separate standard mixed fertilisers which supply copper, zinc and molybdenum in quantities suitable for each of the two types of soil. The No. 1 mix, copper-zinc-molybdenum-super, is recommended for gravelly soils or sandy soils within ten chains of gravelly outcrops. No. 2 mix, with the same molybdenum but half the copper and zinc of No. 1, is suitable for grey, white and yellow sandy soils. Unless these recommended mixtures are applied at about one bag (187 lb.) per acre, adequate amounts of copper, zinc and molybdenum may not be supplied. If it is necessary to use less than one bag per acre for the initial dressing, mixed fertiliser should be used again the following year so that the total of both applications is about one bag per acre.

Lancelin, Cervantes and Jurien Bay

Soils adjacent to the coast in the Lancelin, Cervantes and Jurien Bay districts have special requirements for trace elements. Experiments at Lancelin on deep yellow sands growing banksia and blackbutt showed that large amounts of copper and zinc are necessary for maximum cereal yields. For this soil type, the recommended rates for wheat are 10 lb. per acre of copper sulphate and 2 lb. per acre of zinc oxide. No additional trace elements are needed for a second crop or for the establishment of pastures.

As there is no standard fertiliser mix which provides these amounts of trace elements a special mix is necessary. Alternatively, additional copper can be applied by spraying the crop with 5 to 10 gallons of 0.25 per cent. neutralized copper sulphate per acre. This treatment should be carried out six to eight weeks after seeding. Pastures can be sown without the extra copper but need repeat dressings if animal health is to be maintained.

The coastal yellow sands associated with limestone are also acutely cobalt deficient. As cobalt deficiency affects animal health it is necessary to topdress pastures annually with 4 oz. per acre of cobalt sulphate.

Nitrogen

Nitrogenous fertilisers usually give payable increases in cereal yields in the West Midlands. For the first wheat crop on burnt, non-fallow country 75 lb. of urea per acre is recommended. For well-prepared, burnt and fallowed land, 50 lb. per acre is sufficient. Subsequent crops...
on new land should receive 75 lb. of urea per acre. Profitable yield increases can be obtained with 30 lb. per acre urea with first crops after legume based pastures; 65 to 75 lb. per acre may be profitable for second and successive crops.

Urea should be topdressed no later than six weeks after seeding. There may be some yield advantage in delayed applications but because an extra operation is saved it is common to apply the urea at seeding—if adapted machinery is available.

**Sulphur**

Sulphur deficiency is unlikely to occur on crops and pastures receiving ordinary super in excess of 80 lb. per acre. This is because super contains about 11 per cent sulphur. If the application rates are less than 80 lb. per acre per year, or if double superphosphate is used, sulphur deficiency could occur. Experimental work is in progress in many areas to determine which soils may be liable to sulphur deficiency.

**Lime**

Lucerne is used as a pasture legume on many soils of the West Midlands and should be sown with 300 lb. per acre of 50 : 50 lime-super. If the land has not already received copper, zinc and molybdenum, then bluestone at 7½ lb. per acre, zinc oxide at 1¼ lb. per acre, and roasted molybdenite at 2 oz. per acre should be applied with the lime-super.

On the yellow sands at Lancelin lucerne does not require lime-super. Plain super at 180 lb. per acre and the trace elements are sufficient.

**Other deficiencies**

Trials on the Badgingarra and other research stations have shown that elements such as manganese, boron and iron are necessary only in isolated cases. However, potash could be important for pastures and this element is receiving increasing attention. On the deeper white sands of the West Midlands, the growth of many clovers is extremely poor because of potash deficiency. However, it is unlikely to be profitable to use potash in the early years of development. The sandplain lupin (W.A. blue lupin) is likely to be successful on such soils without potash.
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