Copper, zinc and molybdenum fertilizers for new land crops and pastures: 1969

J W. Gartrell

R. N. Glencross
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Four years of intensive research into soil deficiencies in developing areas have resulted in a more comprehensive understanding of the need for trace elements in Western Australia.

So that farmers can readily determine fertiliser requirements of their new land, the south-west of Western Australia has been divided into the 17 new-land fertiliser zones shown on the map on page 518. Within each zone, new land has the general requirements indicated by the relevant recommendations in this article.

For example, a farmer with a property in zone 17, that is on the coastal strip between Geraldton and Busselton, needs to apply 180 lb. of super copper zinc A, plus 5 lb. bluestone per acre in the northern portion of the zone. In zone 4 however, he would need 220 lb. of super, copper, zinc, molybdenum No. 2.

In some cases, for particular circumstances on individual properties, special recommendations may be needed which differ from the general recommendations for each zone. Research is continuing to determine such special requirements, and to find the need for repeat applications in the different zones. Until such information is available, farmers are advised to contact their local Department of Agriculture advisers, whose knowledge of local soils and conditions enables them to fit recommendations to individual farm situations.

The fertilisers mentioned in the recommendations are commercially available mixtures with the analyses shown in the table below:

<table>
<thead>
<tr>
<th>Fertiliser Mixture</th>
<th>Super (based on 22% ( P_2O_5 ))</th>
<th>Copper Sulphate</th>
<th>Zinc Oxide</th>
<th>Molybdenum Trioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super, copper, zinc, molybdenum No. 1</td>
<td>1 lb.</td>
<td>1 lb.</td>
<td>1 lb.</td>
<td>2 oz.</td>
</tr>
<tr>
<td>Super, copper, zinc, molybdenum No. 2</td>
<td>170</td>
<td>5</td>
<td>1 oz.</td>
<td>2</td>
</tr>
<tr>
<td>Super, copper, zinc A</td>
<td>174</td>
<td>2½ oz.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Super, copper, zinc B</td>
<td>170</td>
<td>5</td>
<td>1 oz.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>174</td>
<td>2½ oz.</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

* Mr. Gartrell was responsible for research in the wheatbelt zones shown on the accompanying map and Mr. Glencross for research in the higher rainfall areas.
Repeat applications

Recommendations in these notes apply to initial applications only. Repeated applications of trace element mixtures are not recommended, although in Zones 1, 2, 10, 12 and 17 repeat applications of copper may be necessary on some soil types. Farmers should always consult their agricultural advisers before repeating trace element applications.

Recommendations

Soils marked with an asterisk need the recommended super rates, but can give maximum yields with less trace elements than supplied by the recommended rates.

Loam and clay soils, other than those mentioned in some zones, do not require copper, zinc or molybdenum fertiliser.

COPPER, ZINC AND MOLYBDENUM FERTILISERS
FOR NEW LAND CROPS AND PASTURES—1969 RECOMMENDATIONS

To be used in conjunction with the map opposite

<table>
<thead>
<tr>
<th>Soil and vegetation</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zone 1—Gingin-Dandaragan</strong></td>
<td></td>
</tr>
<tr>
<td>Red-brown and yellow sands, grey brown</td>
<td><strong>Crop</strong>—Mix A super copper zinc 180 lb. per acre plus 5 lb. per acre copper</td>
</tr>
<tr>
<td>loams carrying redgum, flooded gum</td>
<td>sulphate or a 1% neutralised copper sulphate spray.</td>
</tr>
<tr>
<td></td>
<td><strong>Pasture</strong>—Mix A super copper zinc 270 lb. per acre.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zone 2—Western Grey Sands</strong></td>
<td></td>
</tr>
<tr>
<td>Deep, dark grey sands carrying banksia,</td>
<td><strong>Crop and pasture</strong>—Mix No. 2 super copper zinc molybdenum 180 lb. per acre.</td>
</tr>
<tr>
<td>woollybush, scrub, blackbutt, and redgum,</td>
<td>Other fertiliser: cobalt sulphate 6 oz. per acre; potash 70 lb. per acre in</td>
</tr>
<tr>
<td>jarrah, banksia in the south</td>
<td>north; super-potash 300 lb. per acre after winter in south.</td>
</tr>
<tr>
<td>Black sands varying to peaty sands carrying</td>
<td><strong>Pasture</strong>—Mix A super copper zinc 360 lb. per acre. Other fertiliser:</td>
</tr>
<tr>
<td>paper bark and ti-trees, with kangaroo</td>
<td>Ground limestone 1 ton per acre; cobalt sulphate 6 oz. per acre; 5 : 1</td>
</tr>
<tr>
<td>grass in south</td>
<td>super-potash 180 lb. per acre after winter.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zone 3—West Midland-Allanooka</strong></td>
<td></td>
</tr>
<tr>
<td>Grey sands and brown sandy gravels carrying</td>
<td><strong>Crop</strong>—Mix A super copper zinc 220 lb. per acre. Super molybdenum 180 lb.</td>
</tr>
<tr>
<td>blackboy, low scrub, scattered banksia,</td>
<td>per acre in second year.</td>
</tr>
<tr>
<td>mallee and blackbutt</td>
<td><strong>Pasture not preceded by a crop</strong>—Mix No. 2 super copper zinc molybdenum</td>
</tr>
<tr>
<td></td>
<td>180 lb. per acre in first year.</td>
</tr>
<tr>
<td></td>
<td>Mix B super copper zinc 180 lb. per acre in second year.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zone 4—Midlands-Mingenew-Eradu-Ajana</strong></td>
<td></td>
</tr>
<tr>
<td>Yellow sands carrying blackbutt, banksia,</td>
<td>Mix No. 2 super copper zinc molybdenum 220 lb. per acre.</td>
</tr>
<tr>
<td>pine, wattle scrub</td>
<td></td>
</tr>
<tr>
<td><strong>N.E. Wheatbelt</strong></td>
<td>Mix No. 2 super copper zinc molybdenum 220 lb. per acre.</td>
</tr>
<tr>
<td>Yellow and brown loamy sands and gravels</td>
<td></td>
</tr>
<tr>
<td>carrying wodgil, tamma, mallee, broombush,</td>
<td></td>
</tr>
<tr>
<td>ti-tree, flame grevillea</td>
<td></td>
</tr>
</tbody>
</table>
## COPPER, ZINC AND MOLYBDENUM FERTILISERS FOR NEW LAND CROPS AND PASTURES—1969 RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Soil and vegetation</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Zone 5—Central Wheatbelt</strong>&lt;br&gt;Yellow and brown loamy sands and gravels carrying wodgil, tamma, mallee&lt;br&gt;Grey sands and gravelly sands carrying blue mallee, tamma, wodgil, mallee&lt;br&gt;Grey-brown sands over clay carrying mallee, broombush</td>
<td>Mix No. 1 super copper zinc molybdenum 220 lb. per acre. &lt;br&gt;Mix A super copper zinc 220 lb. per acre in first year.&lt;br&gt;Super molybdenum 180 lb. per acre in second year.&lt;br&gt;Mix B super copper zinc 220 lb. per acre.</td>
</tr>
<tr>
<td><strong>Zone 6—Gnowangerup-Pingrup-North Ravensthorpe</strong>&lt;br&gt;Grey-brown sands over clays and domed clays and shallow clays carrying mallee, broombush, moort&lt;br&gt;Brown and yellow loamy sands and gravels carrying mallee, wodgil, tamma&lt;br&gt;Grey sands and sandy gravels carrying blue mallee, tamma, scrub</td>
<td>Mix B super copper zinc 220 lb. per acre.&lt;br&gt;Mix No. 1 super copper zinc molybdenum 220 lb. per acre.&lt;br&gt;Mix A super copper zinc 220 lb. per acre.</td>
</tr>
<tr>
<td><strong>Zone 7—Western Wheatbelt</strong>&lt;br&gt;Brown and grey sands and gravelly loams carrying wodgil, tamma, whitegum, sheoak</td>
<td>Mix A super copper zinc 220 lb. per acre.</td>
</tr>
<tr>
<td><strong>Zone 8—Northern Whitegum</strong>&lt;br&gt;Coarse gravelly grey and brown loamy sands carrying whitegum&lt;br&gt;Brown sandy loamy gravels (fluffy buckshot gravels) carrying powder bark wandoo-redgum</td>
<td>Mix B super copper zinc 360 lb. per acre.<em>&lt;br&gt;Mix B super copper zinc 360 lb. per acre. (Other for crop—Manganese sulphate 14 lb. per acre or 4% spray, sulphate of ammonia as nitrogen source.</em>)</td>
</tr>
<tr>
<td><strong>Zone 9—Southern Whitegum</strong>&lt;br&gt;Coarse gravelly grey loamy sands—sandy loams carrying whitegum, sheoak&lt;br&gt;Grey and brown sand gravels carrying jarrah</td>
<td>Mix No. 2 super copper zinc molybdenum 360 lb. per acre.*&lt;br&gt;Mix B super copper zinc 360 lb. per acre.</td>
</tr>
<tr>
<td><strong>Zone 10—Jarrah-Redgum, Karri Forest</strong>&lt;br&gt;Grey and brown sandy and sandy loam gravelly soils carrying jarrah-redgum, karri&lt;br&gt;Grey sands—loamy sands over gravel or clay carrying redgum, jarrah&lt;br&gt;Red-brown loams and loamy sands carrying jarrah, blackbutt</td>
<td>Mix B super copper zinc 360 lb. per acre.&lt;br&gt;Mix B super copper zinc 360 lb. per acre.&lt;br&gt;Mix No. 2 super copper zinc molybdenum 180 lb. per acre.&lt;br&gt;Plain super 180 lb. per acre.</td>
</tr>
<tr>
<td><strong>Zone 11—Plantagenet-Albany</strong>&lt;br&gt;All soils carrying redgum, jarrah</td>
<td>Mix No. 2 super copper zinc molybdenum 360 lb. per acre.</td>
</tr>
</tbody>
</table>
### COPPER, ZINC AND MOLYBDENUM FERTILISERS
#### FOR NEW LAND CROPS AND PASTURES—1969 RECOMMENDATIONS

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</tr>
</thead>
</table>
| **Zone 12—Kalgoorlie-Bremer River Plains**  
Brown and grey sands and gravels over clay carrying mallee, stunted jarrah | Mix A super copper zinc 360 lb. per acre first year.  
ON KALGOORLIE R. super molybdenum 180 lb. per acre second year. |
| **Zone 13—South Jerramungup-Lower Fitzgerald**  
Grey sands over clay carrying mallee | Mix B super copper zinc 360 lb. per acre. |
| **Zone 14—Esperance Plain—South Stirlings**  
Grey sands over gravel or clay carrying blue mallee, chittick  
Grey brown sandy gravels carrying mallee | Mix B super copper zinc 270 lb. per acre.  
Mix B super copper zinc 360 lb. per acre. |
| **Zone 15—Scaddan-Hopetoun**  
Brown sandy loams and gravelly sandy loam crabholes and domed clay carrying mallee  
Brown sandy gravels carrying mallee | Mix B super copper zinc 270 lb. per acre.*  
Mix B super copper zinc 270 lb. per acre. |
| **Zone 16—Scaddan-Salmon Gums**  
Grey brown sands over domed clays carrying mallee | Mix B super copper zinc 210 lb. per acre.* |
| **Zone 17—West Coastal**  
Yellow and brown sands, grey calcareous sands North of Yanchep—Banskia, parrot bush, blackbutt, scrub, wattle  
South of Yanchep—Tuart, banksia, redgum, peppermint | *Crop*—Mix A super copper zinc 180 lb. per acre plus 5 lb. per acre copper sulphate or a 1% neutralised copper sulphate spray.  
*Pasture not preceded by a crop*—Mix A super copper zinc 270 lb. per acre.  
*Pasture*—Mix A super copper zinc 360 lb. per acre plus cobalt sulphate 6 oz. per acre. |

* These soils need the recommended rate of superphosphate but can give maximum yields with lower trace element applications than supplied by the recommended fertiliser rates.
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