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Rates of superphosphate for pasture and crop production in the Salmon Gums district

Cover Page Footnote
Mr. R. Fletcher, manager, Salmon Gums Research Station, is thanked for his cooperation. The conclusions in this article are based on the results of experiments conducted by Messrs. M. G. Mason, H. Fisher, and the authors.
RATES OF SUPERPHOSPHATE FOR PASTURE AND CROP PRODUCTION IN THE SALMON GUMS DISTRICT

By R. N. GLEN CROSS and W. J. COX, Research Officers, Plant Research Division

DURING the last few years large areas have been released for cereal and pasture production in the southern part of the Shire of Dundas and the northern part of the Shire of Esperance. Changes in land use since 1962 are summarised in Table 1.

In the same period a series of trials were conducted on new and old land at Salmon Gums Research Station, situated about 60 miles north of Esperance. The aim of the trials was to determine the superphosphate requirements for crop and pasture production on the three main soil types representative of large areas within a 25 mile radius of Salmon Gums.

These soil types are
- Circle Valley sand.
- Kopi.
- Kumarl clay loam.

Circle Valley sand—4 to 12 inches of light grey brown to brown sand over a yellow grey to brown mottled sandy clay subsoil with limestone nodules. The native vegetation on this soil is mallee and sapling eucalypt with tea tree (Melaleuca sp.) undergrowth.

Kopi—grey to greyish brown powdery calcareous sandy loam with increasing clay in the deeper calcareous layers. The native vegetation is predominantly sorrel (E. oleosa), mallee forms of E. oleosa and mallet (E. conglobata).

Kumarl clay loam—red-brown clay loam over clay with lime nodules. This occurs dominantly in the higher country, centred on Dowak, north of Salmon Gums. The native vegetation consists mainly of several sapling and mallee forms of eucalypt including gimlet (E. diptera and E. annulata) E. oleosa and E. calycogona.

Both Kopi and Kumarl sand have a higher salt content than the better class Circle Valley sand.

The average and seasonal rainfall figures for the period of the trials are shown in Table 2.

Table 1.—Land use, Shire of Dundas

<table>
<thead>
<tr>
<th></th>
<th>Total cleared area</th>
<th>Crop area</th>
<th>Rotation</th>
<th>Fallow area</th>
<th>Improved pasture</th>
<th>No. of sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>157,170 acres</td>
<td>28,309</td>
<td>1 : 5.5</td>
<td>15,808</td>
<td>28,335</td>
<td>95,544</td>
</tr>
<tr>
<td>1966</td>
<td>203,978 acres</td>
<td>50,194</td>
<td>1 : 4.1</td>
<td>21,214</td>
<td>37,489</td>
<td>241,024</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td>29.7</td>
<td>77</td>
<td>...</td>
<td>34.2</td>
<td>32.3</td>
<td>152.3</td>
</tr>
</tbody>
</table>

Journal of Agriculture, Vol 9 No 10 1968
Without the addition of superphosphate, wheat yields were low, ranging from 3.0 to 6.9 bushels per acre. This indicates the low level of phosphorus in virgin soil.

Results from the rate of superphosphate trials showed that yields were highest on the Circle Valley sand and lowest on the Kopi. On virgin land the best rate was 210 lb. per acre on Circle Valley sand, and 180 lb. per acre on Kumali sandy loam and Kopi. This is represented graphically in Figure 1.

Phosphorus has a substantial residual value on the soils in this district. For this reason responses to phosphorus decline after some years of super application. It

Since 1963, 18 trials have been carried out at Salmon Gums Research Station to investigate the superphosphate requirements of pasture, wheat, oats and barley on the three dominant soil types—Circle Valley sand, Kopi* and Kumali clay loam. The results show that the best rate of superphosphate to use depends on the crop, soil type and previous superphosphate applied. The requirement for pastures is higher than for crops.

* Kopi is the local name for powdery calcareous soil which was named Beete calcareous sandy loam in the soil survey conducted in 1932 to 1935.

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</thead>
<tbody>
<tr>
<td>1963</td>
<td>215</td>
<td>357</td>
<td>117</td>
<td>140</td>
<td>318</td>
<td>247</td>
<td>198</td>
<td>140</td>
<td>104</td>
<td>36</td>
<td>1,043</td>
<td>97</td>
<td>40</td>
<td>2,009</td>
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<tr>
<td>1964</td>
<td>51</td>
<td>4</td>
<td>55</td>
<td>150</td>
<td>8</td>
<td>203</td>
<td>371</td>
<td>182</td>
<td>191</td>
<td>91</td>
<td>1,046</td>
<td>57</td>
<td>5</td>
<td>1,368</td>
</tr>
<tr>
<td>1965</td>
<td>2</td>
<td>24</td>
<td>43</td>
<td>25</td>
<td>397</td>
<td>242</td>
<td>165</td>
<td>228</td>
<td>78</td>
<td>108</td>
<td>1,218</td>
<td>156</td>
<td>17</td>
<td>1,485</td>
</tr>
<tr>
<td>1966</td>
<td>202</td>
<td>136</td>
<td>2</td>
<td>112</td>
<td>14</td>
<td>222</td>
<td>143</td>
<td>93</td>
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<td>166</td>
<td>757</td>
<td>4</td>
<td>120</td>
<td>1,333</td>
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<tr>
<td>1967</td>
<td>28</td>
<td>4</td>
<td>38</td>
<td>85</td>
<td>222</td>
<td>123</td>
<td>199</td>
<td>265</td>
<td>22</td>
<td>79</td>
<td>910</td>
<td>55</td>
<td>56</td>
<td>1,176</td>
</tr>
<tr>
<td>Ave., 40 years</td>
<td>89</td>
<td>95</td>
<td>104</td>
<td>96</td>
<td>126</td>
<td>154</td>
<td>150</td>
<td>134</td>
<td>125</td>
<td>109</td>
<td>798</td>
<td>81</td>
<td>75</td>
<td>1,340</td>
</tr>
</tbody>
</table>

Table 2.—Average and seasonal rainfall—Salmon Gums Research Station

![Figure 1.—Effect of super rate on wheat yield on virgin Salmon Gums soils](https://example.com/)
follows from this that it is economic for the farmer to reduce the rate of superphosphate progressively, as shown in figure 2. From this figure, which applies to Circle Valley sand, the approximate superphosphate requirement for cropping can be read, if the super history is known.

In all new land trials superphosphate applied through the combine at seeding has proved most efficient. However, on old land, topdressing before seeding may be just as effective. In one trial on Circle Valley loamy sand with a total super history of 2,200 lb., topdressing in April produced the same crop yields as a drilled application at seeding.

On soils which have received less than this quantity of superphosphate it is advisable to drill superphosphate with the seed.

The majority of trials had two sub-treatments, one with no urea and one with 25 lb. of urea per acre. On new land, with or without fallow, there was no response to urea.

Conclusions and recommendations

- In these trials yields were highest on Circle Valley sand and lowest on Kopi soils. Soil texture and improved water relations probably accounted for the difference.
- There was no response to urea by the first crop on new land, irrespective of soil type.
- Superphosphate applications for the first and second wheat crops should be 210 and 180 lb. per acre on Circle Valley sand, and 180 and 150 lb. per acre on Kopi and Kumarl soils.
- Drill all superphosphate with the seed. Do not topdress super before seeding.
- The best rate of superphosphate for cropping and topdressing decreases with increasing previous application. In later years decrease the rate of super used when cropping as per Figure 2.
• On old land which has received more than 1,500 lb. per acre, the superphosphate requirement is from 30 to 45 lb. per acre.

• After the first or second cereal crop 180 lb. per acre of super should be drilled with the pasture seed.

• Second and third year pasture should be topdressed with super at 150 lb. per acre. The rates of super needed for pasture top-dressing are about 30 lb. per acre more than for crops.

ACKNOWLEDGMENTS

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Reference

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