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Phosphate Requirements of Rice in the Ord River Valley

By P. J. VAN RIJN* and A. L. CHAPMAN*

A three-year experiment on the initial and maintenance phosphate requirements of wet-season rice was carried out at Kimberley Research Station between 1960 and 1963. Application of 2 cwt. per acre superphosphate as the first application on new land, followed by annual application of 1½ cwt. per acre is recommended.

On the Kununurra clay soil of the Ord River valley, phosphate fertiliser is required for all crops.

For rice, early experiments showed the need for approximately 2 cwt. per acre superphosphate as the initial application on new land (Langfield 1961), but the amount required annually to maintain the yield of subsequent rice crops was not known. In 1960-63, a three-year experiment was carried out at Kimberley Research Station to determine more precisely the initial phosphate requirement and also to establish the annual maintenance application for wet-season rice.

Methods

The variety used was Meli No. 2, grown from November to May each year. During the intervening dry seasons the land was maintained as a clean fallow. In the first season on new land superphosphate was applied at the rates of 0, 2, 4, and 8 cwt. per acre. In the second season, the residual value of these applications was compared with fresh applications of 0, 1, 2, and 4 cwt. per acre on new land. In order to determine subsequent annual requirements, ¼, ½, 1, and 2 cwt. per acre were superimposed on earlier applied dosages of the previous two seasons. In addition to the various phosphate applications, each crop received 2 cwt. per acre ammonium sulphate.

The design used was a partially balanced scheme with four replications. Each plot was 70 ft. x 14 ft. sown, fertilised and harvested mechanically.

Response on New Land

From the results it has been possible to construct a yield response curve to applications of superphosphate on new land (Fig. 1).

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At least \( \frac{1}{2} \) cwt. per acre is required to establish the crop. The yield rises sharply as the application is increased to 2 cwt. per acre, but at this level yield is over 95 per cent. of the maximum, and heavier dressings give little further response.

**Response to Maintenance Applications**

Using this value, it is possible to predict approximately the expected average yield of successive rice crops receiving different applications of superphosphate. Beginning with an initial dressing on new land of 2 cwt. per acre, the expected average yields are:

<table>
<thead>
<tr>
<th>Annual Super Dressing (cwt./ac.)</th>
<th>Expected Rice Yield (lb./ac.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,680</td>
</tr>
<tr>
<td>1( \frac{1}{2} )</td>
<td>2,910</td>
</tr>
<tr>
<td>2</td>
<td>2,950</td>
</tr>
</tbody>
</table>

At present prices for rice and superphosphate, 1\( \frac{1}{2} \) cwt. per acre each year is the most economical level. These yields were obtained with Meli No. 2, the standard variety at the start of the trial. It has since been replaced by Sirinca, a variety of higher yield and quality.

It is probably safe to assume that these results would apply also to a cropping system of continued dry-season rice. However, it is not known at present to what degree the results are applicable to irrigated crops grown on the Ord River under non-flooded conditions—cotton, safflower, or linseed. A similar experiment with cotton is due to begin in 1963-64.

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