Response of *Zea mays* to the Residual Effect of Phosphorus Fertilizers in Latosolic Soil

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INTRODUCTION

Maize → grain for food and feed
  stalk for feed

Land for crops production → acid latosolic soil
Latosolic soil

Low soil pH (acid soil)
Phosphorus deficiency →
limiting crop production on acid soils

Solution → superphosphate (expensive, water soluble phosphate source)
phosphate rock
(cheap, slow release, acid soluble)
Land area (000 ha) 181 157
lowlnd (000 ha) 8 863
upland (000 ha) 122 289
CONSUMPTION AND PRODUCTION OF PHOSPHATE ROCK IN INDONESIA
(1,000 tonnes)
(Adiningsih et al, 1998)

<table>
<thead>
<tr>
<th></th>
<th>1980</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total $\text{P}_2\text{O}_5$ consumption</td>
<td>274</td>
<td>360</td>
</tr>
<tr>
<td>PR consumption</td>
<td>13</td>
<td>69</td>
</tr>
<tr>
<td>PR production</td>
<td>1</td>
<td>?</td>
</tr>
<tr>
<td>(1988) Java Island</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Map of Indonesia (1988)
Can we directly use phosphate rock as a cheap source of P fertilizer to improve crop production?

Can PR be used as a substitute for SP?

Response to the residual effect of P fertilizers?
Objective

To evaluate the effects of PR and SP fertilizer on the maize grain yield in acid latosolic soil on two periods of planting.
MATERIALS AND METHODS

Field experiment → 3 months
Latosolic soil pH → 4.73 (block I), 25.87 ppm
and available P → 4.43 (block II), 21.35 ppm
4.28 (block III), 17.20 ppm
Treatment → 0 - 66 -132-198 kg P ha⁻¹ (once)
P sources → phosphate rock (27 % P₂O₅)
superphosphate (36 % P₂O₅)
Standard fertilization $\rightarrow$ 100 kg N ha$^{-1}$ (urea) 
83 kg K ha$^{-1}$ (KCl)

Plot size : 3.5 m x 2.5 m

2 plants / hole

Two periods of maize planting

Harvested on 3 months after planting

Analyzed $\rightarrow$ grain yield on 14 % moisture.
## Maize grain yield with P fertilizers and the residual effect

<table>
<thead>
<tr>
<th>Level of P kg ha(^{-1}) (once)</th>
<th>First Planting</th>
<th>Second Planting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PR</td>
<td>SP</td>
</tr>
<tr>
<td>ton ha(^{-1})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4.02 d</td>
<td>4.08 d</td>
</tr>
<tr>
<td>66</td>
<td>5.19 c</td>
<td>6.28 c</td>
</tr>
<tr>
<td>132</td>
<td>5.88 bc</td>
<td>7.34 a</td>
</tr>
<tr>
<td>198</td>
<td>6.25 bc</td>
<td>7.59 a</td>
</tr>
</tbody>
</table>

Means followed by the same letters at the same period are not significantly different at DMRT 5%
Maize grain yield was increased by phosphorus fertilization (PR, SP) in two periods of planting.

Maize grain yield was lower with phosphate rock application compared to superphosphate in the first planting.

Residual effect on maize grain yield of phosphate rock and superphosphate was not different in the second planting.
Conclusions

Phosphorus fertilizer could increase maize grain yield.

Maize grain yield was higher with superphosphate fertilizer than with phosphate rock in the first planting.

Maize grain yield in the second planting did not differ between superphosphate and phosphate rock.
Thank you