

IRRIGATED RICE RESPONSE TO N, P AND K ON LEACHING-PRONE  
NON-CALCIC BROWN SOILS, MAHAWELI SYSTEM B

By

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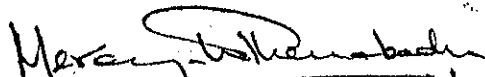
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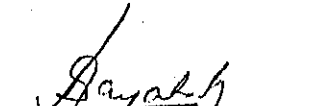
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## ABSTRACT

The NPK requirement of lowland rice on a Non-Calcic Brown (NCB) soil was investigated in maha (wet) 1984-85 and yala (dry) 1985.

In maha there were 64 combinations of NPK (4 x 4 x 4): 0, 60, 120 and 180 kg N ha<sup>-1</sup>; 0, 15, 30 and 45 kg P ha<sup>-1</sup>; 0, 40, 80 and 120 kg K ha<sup>-1</sup>. Yields ranged from 1.57 to 5.5 t ha<sup>-1</sup>. The highest yield was obtained with 120 kg N, 15 to 30 kg P and 80 kg K ha<sup>-1</sup>. The lowest yield was with no fertiliser. Linear and quadratic trends for N, P and K were all significant but the interactions were not.

In yala 18 NPK combinations (3 x 2 x 3) were tested: 50, 100 and 150 kg N ha<sup>-1</sup>; 25 and 50 kg P ha<sup>-1</sup>; 40, 80 and 120 kg K ha<sup>-1</sup>. The highest yield of 4.31 t ha<sup>-1</sup> was obtained with 100 kg N, 50 kg P and 80 kg K ha<sup>-1</sup>.

Using fertiliser prices during the period of the experiment, the economic optimum NPK rates were 122 kg N, 24 kg P and 58 kg K ha<sup>-1</sup>. This compares with Department of Agriculture recommendations of 90 kg N, 25 kg P and 40 kg K ha<sup>-1</sup>.

In yala, four and six split broadcast applications of N were compared with four split deep placement, each at 40, 80 and 120 kg N ha<sup>-1</sup>. At 40 and 80 kg N ha<sup>-1</sup>, plots with deep placement and surface application in six splits had the highest yields. Surface application in 4-splits was least efficient, requiring 120 kg N to produce the best response. At 80 kg N deep placement resulted in increases of 880 kg ha<sup>-1</sup> paddy over the best surface application.

The soil extractable ammonium-N content increased sharply after each fertiliser application followed by a gradual decline, due to hydrolysis of urea; with deep placement the surge was smaller. The soil extractable nitrate-N also increased after each application of urea but in contrast with ammonium-N, the surges were greatest with deep placement.

The plant nitrogen uptake varied from 20 kg ha<sup>-1</sup> with no fertiliser applied, to 55 kg N with 6-splits of 120 kg N as urea. The highest yield at 80 kg N ha<sup>-1</sup> corresponded to an uptake of 45 kg N. Efficiency of N, due to leaching and other causes, was least with 120 kg N ha<sup>-1</sup> of urea applied to the surface soil.

