

## Growth and yield components of rice under different NPK rates in prateah lang soil type in cambodia

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### Abstract

The NPK are known as macro elements that affect crop growth and yield. In 1989, Cambodia Agricultural Research and Development Institute (CARDI) gave a recommendation rate of fertilizer on rice production based on soil types. This recommended rate of NPK seems however relatively low as compared to farmers' practices nowadays and the amount in the neighboring countries. The CARDI recommended rate for Prateah Lang soil type is 50kg N, 25kg P<sub>2</sub>O<sub>5</sub>, 25kg K<sub>2</sub>O ha<sup>-1</sup> while recent farmers' practice rates are 55 - 64kg N, 24 - 46kg P<sub>2</sub>O<sub>5</sub>, 30kg K<sub>2</sub>O ha<sup>-1</sup>. However, the overuse of chemical fertilizer will lead to un-preferable plant growth, insect pest, disease and economic yield. Thus, we examined the effect of different NPK application rates on the growth and yield components in Prateah Lang soil type in Takeo province to investigate appropriate rates for improving rice productivity with economic efficiency. This study was conducted from July to November during wet season in 2013. A multi-locational trial with 6 treatments (T<sub>0</sub> - T<sub>5</sub>) of NPK rates in 5 locations (trial 1 - 5) with 3 replications was conducted. The different combinations of NPK application were employed from 0, 50, 60, 80, 100, 120kg N ha<sup>-1</sup>, 0, 25, 30 45, 60kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> and 0, 15, 25, 30, 45kg K<sub>2</sub>O ha<sup>-1</sup>. Urea, DAP and KCl were used for fertilization. Split application was employed [basal: 20% of N, 100% of P and K, top dressing-1st: 40% of N (30DAT), 2nd: 40% of N (PI stage)]. Three-week-old seedlings of var. Phka Rumdoul were transplanted with 2 - 3 seedlings hill<sup>-1</sup> with 20cm×20cm spacing. Plant length, tiller number at the maximum tillering stage and yield components were measured. The different rates of NPK application affected some yield components. The panicle number per hill was the most important key component followed by the spikelet number per panicle. However, the other parameters such as the filled grain percentage and 1000 grains weight had small effect or weak relation with the yield. Although the panicle number per hill had a significantly positive correlation with the stem number per hill, it was not correlated with the percentage of productive culms. The variation in the grain yield among the 5 trials was small and the difference was not significant. Although the yield tended to be higher at higher N and P application, there was no significant difference above 60kg N and 30kg P<sub>2</sub>O<sub>5</sub>. The yield was the highest at 15, 30 and 45kg K<sub>2</sub>O followed by 25kg K<sub>2</sub>O. The relationships between N, P and the stem number per hill were significantly linear positive, though it was not linear between K and the stem number. From these results, to increase rice productivity in the target area, farmers' effort to increase N and P input rather than CARDI recommendation up to 60kg N and 30kg P<sub>2</sub>O<sub>5</sub> will be sufficient considering economic efficiency. Besides, the amount of K application should be reconsidered.

Keywords: economic efficiency, fertilizer, paddy rice, productivity, yield components

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