

Phosphorus rates as affecting upland rice grain yield in Suriname

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INTRODUCTION

Upland rice, which is cultivated in the inner land of Suriname by the Maroon people (African descendents), which concentrate in the districts of Brokopondo and Sipaliwini (Fleskens and Jorritsma, 2010). They use local varieties, which are cultivated by a traditional method without using fertilization, seeds, pesticides and mechanization and have a yield around 1,000 kg ha⁻¹ (Young and Angier, 2010). Among the aspects to be improved aiming higher grain yield is the plant fertilization management, since with proper balanced supply of nutrients and the use of fertilizers can achieve significant increases in grain yield (Nascente and Lanna, 2016). Phosphorus (P) is an essential element in plant metabolism, which significantly contribute for increasing grain yield and root development, in addition several studies around the world have shown the positive effect of P fertilization in growth, yield components, and grain yield of rice (Fageria et al., 2013; Nascente et al., 2014). Our objective was to evaluate rates of P in the development of upland rice in Suriname.

METHODS

Trial was arranged in a randomized complete block design with four replications. The treatments consisted of four P₂O₅ rates (0, 40, 80 and 120 kg ha⁻¹ as triple superphosphate) applied on the bottom of the row before sowing. It was used the local variety Topi-Topi. Nitrogen and K was broadcast on the soil surface after rice sowing. It was applied 10 kg ha⁻¹ of N as urea and 60 kg ha⁻¹ of K₂O, as patent kali. Nitrogen topdressing fertilization (as urea) was done 20 and 40 days after rice emergence using 40 kg ha⁻¹ of N as urea in each application.

RESULTS

All of variables evaluated, with exception of number of grains per panicle, had increased values in a quadratic fashion with increasing P rates of 0 to 120 kg P₂O₅ ha⁻¹ (Figure 1). The rate of 98.06 kg ha⁻¹ of P₂O₅ applied at sowing allowed the highest rice grain yield of 3085 kg ha⁻¹. The morphological parameters of plant biomass, plant height, number of panicle, mass of grains and grain yield had significant influence in response to P doses used. These results were expected, since the P content in the soil were low (15.8 mg dm⁻³) and thus the application of this nutrient via fertilization was efficient to provide significant increases in the evaluated parameters. Other authors have also reported response to P fertilization on rice (Fageria et al., 2013, Nascente et al., 2014). Rate of 98.06 kg ha⁻¹ P₂O₅ applied at sowing provided highest rice grain yield of 3,085 kg ha⁻¹.

CONCLUSIONS

The proper use of phosphorus rate was adequate to provide a significant increase in upland rice yield, once rate of 98.06 kg ha⁻¹ P₂O₅ applied at sowing provided highest rice grain yield of 3085 kg ha⁻¹ that is three time more than the Surinamese rice average yield.

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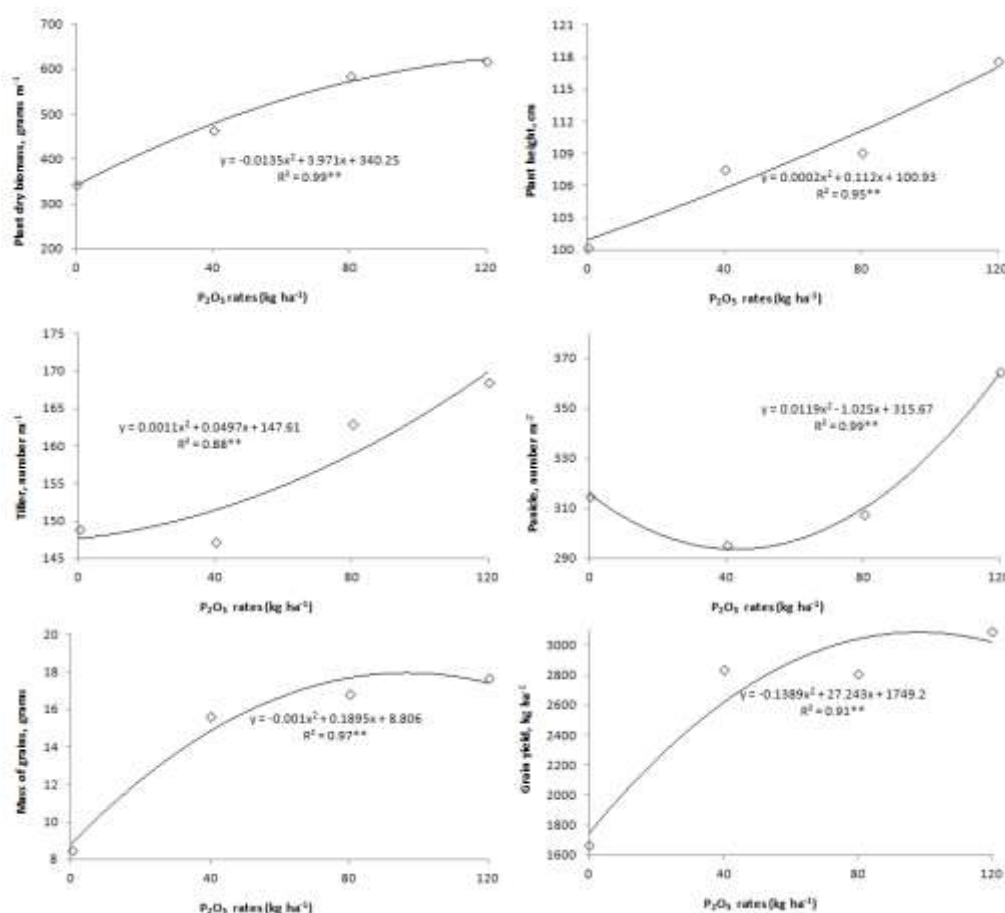


Figure 1. Dry biomass, plant height, number of tillers, number of panicles, number of grain per panicle, mass of 1000 grains and grain yield of Cultivar Topi-Topi as affected by P₂O₅ rates. Suriname, growing season 2016.