EFFECTS OF POTASSIUM AND MAGNESIUM FERTILIZERS ON GROWTH YIELD AND MINERAL COMPOSITION OF *Hevea brasilliensis*

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ABSTRACT

The effects of potassium and magnesium fertilizers on the yield of latex was studied by measuring growth and determining the nutrient content of *Hevea brasiliensis* clones PB 86, RRIC 100, RRIC 102, RRIC 110 and RRIC 121 growing in *Boralu, Agalawatta, Ratnapura, Homogama* (red yellow podzol) and *Parambe* (reddish brown latazol) series soils. The main objective of the study was to compare the K and Mg requirements during the early stages of their growth. Observation were also made to identify the foliar deficiency symptoms of these two elements in their early as well as advanced stages of leaf development.

Three experiments in pots and two in the field were carried out during the course of this study.

In pot experiment 1 the effect of three levels of potassium were compared on five soil series namely *Boralu, Agalawatta, Ratnapura, Homagama and Parambe*, on the performance of clone RRIC 100 which is recommended for large scale planting. Experiment 2 in pots dealt with the effects of five levels of K on five clones namely PB 86, RRIC 100, RRIC 102, RRIC 110 and RRIC 121. The experiment 3 was similar to that of experiment 2. Experiment 4 done in the field compared five levels of K and two sources of Mg namely kieserite and dolomite and Field experiment 5, dealt with the effect of three levels of K and Mg fertilizers on the performance of clone PB 86.

The parameters use to assess treatment effects on growth were stem diameter and girth at a fixed height above bud union, plant height, total dry weight, shoot dry weight, root dry

weight, leaf dry weight, root/shoot ratio, leaf area, net photosynthetic rate, relative growth rate and leaf weight ratio. Total nitrogen, phosphorus, potassium, magnesium, calcium and manganese content of leaves, soil and bark were recorded to indicate the effects of treatments on mineral composition and these data were also used to express nutrient ratios in leaves.

The pattern of occurance of visual magnesium deficiency symptoms appear to vary between clones. In clone RRIC 102, the yellowing was not contiguous with leaf margin whereas the clone RRIC 121, the development of the interveinal yellowing commenced from the leaf margin. Deficiency symptoms of potassium characterised by marginal yellowing followed by scorching.

Although, *Parambe* soils are inherently high in potassium in comparison with the other soil series, there were no differences in response to applied K on growth during the first year. Nevertheless plants growing in *Parambe* series exhibited the highest rate of growth in the first year but this effect was not related to levels of applied potassium. All clones tested viz. PB 86, RRIC 100, RRIC 102, RRIC 110 and RRIC 121 when grown on PB 86 root stock were found to exhibit normal growth without application of K fertilizers where the exchangeable soil K value was found to be in the region of 0.05 me/100g soil.

Clone RRIC 102 appeared to be physiologically superior to the clone PB 86, RRIC 100, RRIC 110 and RRIC 121 with regard to growth in the first year when they were raised by brown budding technique and were not influenced by applied potassium. But with green budding clone RRIC 121 was found to be superior.

Where there had been growth responses to applied potassium, at the K_1 level of application, equivalent to 33g/tree/year, it significantly increased girthing but no further increase was obtained with increase in potassium at K_2 level, equivalent to 66g/tree/year. Moreover, there were no clonal differences with regard to response to application of K. Potassium application was found to significantly depress the foliar and bark Mg contents in all the clones except in clones RRIC 102. Similar antagonistic effect was shown by Mg when applied in the form of dolomite, decreasing the K content of leaves. Dolomite application was however found to increase the leaf calcium content. Application of Mg in the form of kieserite however increased the leaf Mg content in comparison with dolomite. Application of potassium was also found to increase the K/Mg, K/Ca and K/(Ca+Mg) ratios in the leaves.

Application of potassium at K_2 level (66g/tree/year) was found to prevent the occurance of a shoot die back disease caused by *Botryodeploidea theobroma* which attacks developing shoots in the control plots.