POTASSIUM RATES FOR MACROTYLOMA AXILLARE GROWTH

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ABSTRACT
The response of the tropical forage legume macrotiloma guata (*Macrotyloma axillare* (E. Mey) Verdc) to potassium rates was studied in a greenhouse experiment. The plants were grown in nutrient solution with seven potassium (K) rates, 0; 3.5; 7; 21; 35; 105 and 245 mg l^{-1} of solution, in randomized complete block design, with four replications. There was significant response of the legume to potassium rates. Considerations are made on the influence of these levels on plant dry matter yield in two harvests, root dry matter production and potassium and magnesium concentrations in the plant tissue.

KEYWORDS
Forage legume, *Macrotyloma axillare*, potassium, magnesium

INTRODUCTION
Macrotyloma axillare, an African legume (Cameron, 1986) is according to Blumenthal & Staples (1993) a tropical forage that showed good results in some parts of the world, and can have good potential for the future. In São Paulo State, Brazil, the cultivar guata of *Macrotyloma axillare* (E. Mey) Verdc showed promising results in associated pastures (Bufarah *et al.*, 1981).

In mixed pastures, the competition between grass and legume for the nutrients is one of the important factors in the establishment and maintenance of the tropical legume, especially for potassium (Werner & Monteiro, 1974). The application of potassium increases the production of the legume in the association and the concentration of this nutrient in the plants (Monteiro *et al.*, 1980; Werner *et al.*, 1983). Colozza & Werner (1984) and Gontarski (1991) observed that the lack of potassium decreased significantly the herbage yield of macrotiloma but deficiency symptoms were not noticed.

This research was carried out in order to evaluate the plant top and roots production and nutrients concentration on the tissues of the tropical legume *Macrotyloma axillare* (E. Mey) Verdc cv. guata grown with potassium rates.

MATERIALS AND METHODS
The study was carried out in a greenhouse at ESALQ-University of São Paulo, in Piracicaba city, Brazil. Seeds were sown in washed sand and, after eight days, 14 seedlings were transplanted to each plastic pot. Ground quartz was used as substrate to the plants. Successive rough-hewings were done until five plants were left in each pot. The nutrient solution was kept in the pots during the day and drained at night, in order to provide oxygen to the roots.

Seven potassium rates, 0; 3.5; 7; 21; 35; 105 and 245 mg l^{-1} of solution were applied in randomized complete block design, with four replications. For the other nutrients, the necessary amounts were based in Sarruge (1975) nutrient solution.

Two harvests were carried out in this experiment. The first harvest took place 44 days after seeding and the second harvest, 24 days after the first one. The forage produced, including roots after the second harvest, was identified, dried in a stove at 65ºC until reaching constant weight, weighed, ground and chemically analyzed according to Sarruge & Haag (1974).

RESULTS AND DISCUSSION
The results showed significant correlation between potassium rates and herbage yield ($P<0.01$), and potassium ($P< 0.05$) and magnesium ($P<0.05$) concentration in plants tissues. The dry matter production of plant top and roots increased with the rates of potassium in the nutrient solution up to 172, 175 and 165 mg l^{-1} in the first and second harvest and roots, respectively, as shown in *Figure* 1. Potassium concentrations higher than those resulted in a decrease in forage yield, probably due to the interference of its excess in the absorption of other nutrients.

The magnesium concentration decreased linearly from 5.2 to 1.1 and 3.2 to 2.1 g kg^{-1} in the first and second harvest, with the minimum and maximum levels of applied potassium, respectively. Similar results were obtained by Gontarski (1991) that observed a decrease in magnesium concentration in macrotiloma tissue from 4.1 to 3.2 g kg^{-1} when potassium was applied in the soil.

In *Figure 2* it is shown that the concentration of potassium increased linearly in the roots and followed a quadratic model for the plant tops with the potassium rates. The maximum concentration of this nutrient in the plant top was 20.4 g kg^{-1}, in the first harvest. The critical level of potassium estimated for macrotiloma in this study was 11.8 g kg^{-1} for the first harvest, and was higher than the critical level average (7.6 g kg^{-1}) of several tropical legumes presented by Smith (1978).

Despite of the low dry matter yield during the first growth for low potassium rates in the solution, deficiency symptoms of the nutrients were only observed during the second growth, in the treatments 3.5; 7 and 21 mg l^{-1} of potassium in the solution. Gontarski (1991) did not observe these symptoms in a experiment of K-omission with macrotiloma in a soil with low level of exchangeable potassium. The deficiency symptoms of potassium in this experiment were characterized by the chlorosis followed by the necrosis in the border of older leaves and also by the early senescence of such leaves.

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Figure 1
Effect of potassium rates in dry matter production of *Macrotyloma axillare*, in a experiment with nutrient solution.

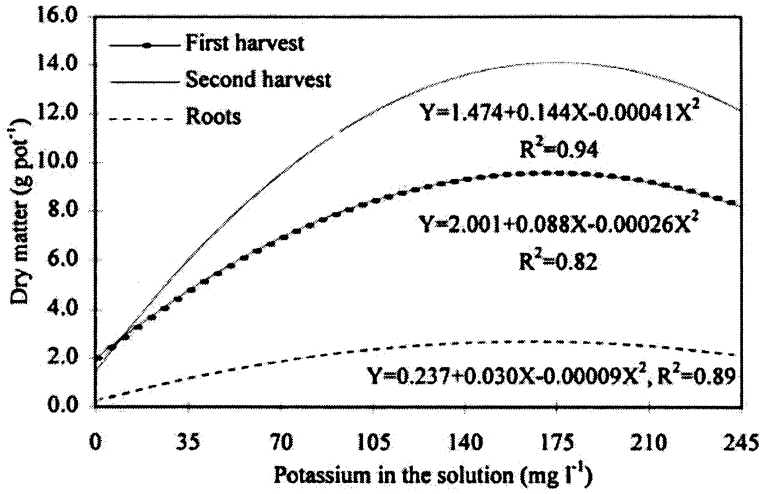

Figure 2
Effect of potassium rates in potassium concentration in the tissue of *Macrotyloma axillare*, in a experiment with nutrient solution.