PLANT HEIGHT OF TAQUARA BAMBOO FERTILIZED WITH POTASSIUM AND ZINC

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ABSTRACT: The bamboo is a member of the Poaceae family, with 1439 species, among them, the *Bambusa tuldoides* is a species of medium-sized and is widely used in the production of cellulose. The objectives of this work were to assess plant height of Taquara plants (*Bambusa tuldoides*) fertilized with potassium and zinc. The experimental design was randomized block, in a split-split-plot arrangement (2 × 2 × 4) with three replications, with two potassium rates in the plots (0 and 80 kg ha^{-1}), two zinc rates in the subplots (0 and 5 kg ha^{-1}), and four evaluation times in the sub-subplots (60, 90, 120 and 150 days after sprouting). Morphological characteristics: plant height was evaluated monthly. Plant height and were measured using a tape measure. The fertilization with potassium rates and zinc influences the growth and development of Taquara plants (*Bambusa tuldoides*).

KEYWORDS: *Bambusa tuldoides*; potassium chloride; zinc sulphate.

INTRODUÇÃO

Bambusa tuldoides is native to China and is widely cultivated in tropical and subtropical regions of America (Guerreiro & Lizarazu, 2010), the first record of the cultivation of *Bambusa tuldoides* Munro in Argentina was by Parodi (1943), for Buenos Aires and the neighboring countries: Brazil, Chile, and Uruguay.

The bamboo is a member of the Poaceae family, with 1439 species, among them, the *Bambusa tuldoides* is a species of medium-sized and is widely used in the production of cellulose, while others are used to control erosion, as forage, as ornamental plants and as a source of biomass for energy production (Spolidoro, 2008; Sungkaew et al., 2009; BPG, 2012; Morais et al., 2015; Generoso et al., 2016).

The objectives of this work were to assess plant height of Taquara plants (*Bambusa tuldoides*) fertilized with potassium and zinc.

MATERIAL E MÉTODOS

The experiment was conducted under field conditions, at the experimental station of the Federal Institute of Goiás, in Rio Verde GO, Brazil (17°48'28"S, 50°53'57"W, and

average altitude of 720 m). The climate of the region is classified as Aw (tropical), according to Köppen and Geiger (1928), with a rainy season from October to May and a dry season from June to September. The region presents mean annual temperature of 20 °C to 35 °C, mean annual precipitation of 1,500 to 1,800 mm, and slightly wavy relief (slope of 6%).

The soil of the experimental area was classified as dystroferric Red Latosol (Oxisol) (Embrapa, 2013). Undisturbed soil samples were collected form the 0.0-0.2 and 0.2-0.4 m layers for physical and chemical characterization (Table 1).

Table 1. Physical-chemical characteristics of a Dystroferric Red Latosol (Oxisol) (dfRL) soil collected from the 0.0-0.2 and 0.2-0.4 m layer.

Layer[1]	Ca^{2+}	Mg^{2+}	Ca+Mg	Al	H+Al	K^{+}	S	P	pH
m			$cmol_c\ dm^{-3}$				$mg\ dm^{-3}$		$CaCl_2$
0.0-0.2	5.6	0.9	6.5	0.0	3.1	133	7.5	3.6	5.8
0.2-0.4	2.8	0.5	3.3	0.0	2.9	142	9.1	1.7	5.8
Layer	Micronutrients								
	Na^{+}	Fe	Mn	Cu	Zn	B	CEC	SB	V%
m			$mg\ dm^{-3}$				$cmol_c\ dm^{-3}$		%
0.0-0.2	4.0	19.9	37.0	1.5	1.7	0.6	9.9	6.8	69
0.2-0.4	3.0	20.2	22.8	1.9	0.9	0.5	6.5	3.6	56
Layer	Texture				Relationship between bases				
	Clay	Silt	Sand	OM	Ca/Mg	Ca/K	Mg/K	Ca/CTC	Mg/CTC
m		%		$g\ dm^{-3}$	-	-	-	-	-
0.0-0.2	42	10	48	31.4	6.3	16.4	2.6	0.56	0.09
0.2-0.4	52	7	41	22.4	5.8	7.7	1.3	0.43	0.07

[1]Determination methods: P, K, Na, Cu, Fe, Mn. and Zn: Mehlich 1; Ca, Mg, and Al: KCl 1 N; S: Ca $(H_2PO_4)_2$ in HOAc; OM: calorimetry; B: $BaCl_2$. Cation exchange capacity (CEC); Sum of bases (SB); Saturation by bases (V%); Organic Matter (OM).

The experimental design was randomized block, in a split-split-plot arrangement (2 × 2 × 4) with three replications, with two potassium rates in the plots (0 and 80 kg ha^{-1}), two zinc rates in the subplots (0 and 5 kg ha^{-1}), and four evaluation times in the sub-subplots (60, 90, 120 and 150 days after sprouting).

Potassium and zinc fertilization were applied according to the treatments, using potassium chloride (K_2O), and zinc sulphate as sources, respectively. The soil of all treatments was fertilized with nitrogen (80 kg ha^{-1}; urea), phosphorus (80 kg ha^{-1}; triple superphosphate) and micronutrients, except zinc, according to soil analysis.

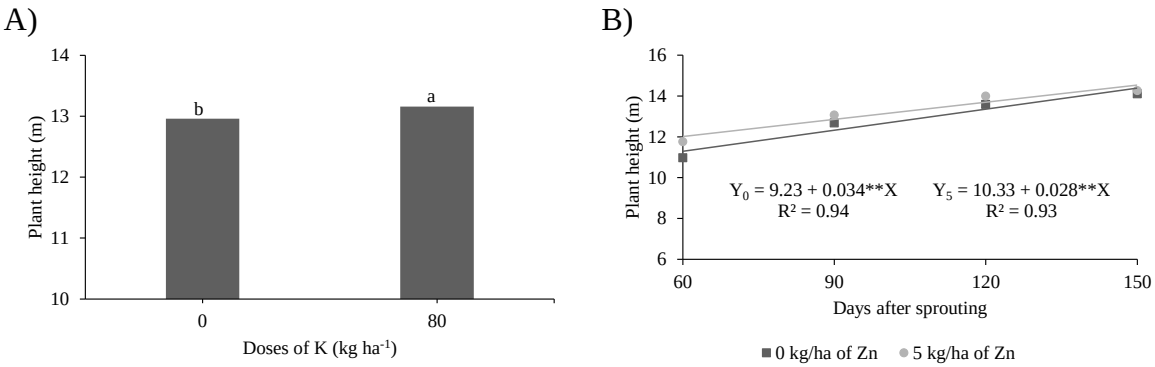
Morphological characteristic plant height was evaluated monthly. Plant height were measured using a tape measure.

The data were subjected to analysis of variance by the F test at 5% probability level, and significant means were subjected to regression analysis considering the evaluation periods, and Tukey's test ($p<0.05$) considering the fertilizer rates, using the R program (R Core Team, 2015).

RESULTADOS E DISCUSSÃO

The plant height of the Taquara (*Bambusa tuldoides*) bamboo without K fertilization was 1.5% lower than that with K rate of 80 kg ha^{-1} (Figure 1A). The plant height as a function

of days after sprouting (DAS) of plants with and without zinc fertilization fitted to a linear model, with R^2 above 93% (Figure 1B).



** F value significant at 1% of probability

Figure 1. The plant height of Taquara plants (*Bambusa tuldoides*) as a function of potassium rates (A) and days after sprouting for zinc rates of 0 and 5 kg ha^{-1} of Zn (B).

According to Prajapati and Swaroop (2016) plants grown in K treatments were 9.33% taller than the plants grown without K fertilization.

The regression equation showed increases in plant height of 7.17%, and 5.79% every 30 days for Zn rates of 0 and 5 kg ha^{-1}, respectively (Figure 1B). Comparing Taquara growth, at 60 and 150 DAS, in the Zn rates of 0 and 5 kg ha^{-1}, the plant height showed differences of 21.52%, and 17.39%, respectively, in relation to the DAS.

Taquara plants fertilized with 5 kg ha^{-1} of Zn presented plant height of 6.77%, 2.96%, and 2.87% higher than the plant height found in Taquara plants without zinc fertilization, at 60, 90, and 120 DAS, respectively (Table 2). Devi and Ghosh (2017) showed that Zn fertilization recorded significantly higher plant height (3.44%). No difference in plant height was found at 150 DAS, probably due to growth stabilization.

Table 2. The plant height of Taquara plants (*Bambusa tuldoides*) fertilized with zinc

DAS[1]	Zn (kg ha^{-1})	
	Plant height (m)	
	0	5
60	10.97 b	11.77 a
90	12.69 b	13.07 a
120	13.60 b	14.00 a
150	14.11 a	14.27 a

[1]Means followed by different letters, lowercase in the row, differ by Tukey test ($p < 0.05$).

According to Gul et al. (2011), the maximum plant height was recorded in those plots with K and Zn fertilization they explained that this might be due to the application of K and Zn provide increments the stem length at boot stage which in turn resulted in maximum plant height.

CONCLUSÃO

The fertilization with potassium rates and zinc influences the growth and development of Taquara plants (*Bambusa tuldoides*).

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