

# BRACHIARIA BRIZANTHA RESPONSE TO PHOSPHORUS RATES IN THE NUTRIENT SOLUTION

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## ABSTRACT

Seven phosphorus rates in the nutrient solution were studied in a greenhouse experiment for *Brachiaria brizantha* (Hochst) Stapf. Plants had 54 days of growth and 49 days of regrowth. Significant responses in forage yield, tiller number and root dry weight were found. Plant tops were divided into four parts and phosphorus concentration in each one significantly changed with phosphorus rates. Sampling of the young leaf blades and analyzing for phosphorus is proposed for diagnostic purposes. A critical phosphorus concentration of 1.2 g kg<sup>-1</sup> is suggested as the critical level in the young leaf blades.

## KEYWORDS

*Brachiaria*, Phosphorus, nutrient solution

## INTRODUCTION

About 40 million hectares of Brazilian pastures is covered by species of the genus *Brachiaria*. More than 85% of this area is occupied by *Brachiaria decumbens* and *Brachiaria brizantha* (Valle & Milles, 1994). The cultivar Marandu of *Brachiaria brizantha* was released by EMBRAPA (Nunes et al., 1985) and it has been preferred by the farmers in recent years.

Phosphorus is one of the most limiting soil factors for pasture establishment in Central Brazil (Werner, 1994) as well as in most tropical areas.

The response of several grasses to phosphorus supply is already known. Also, the basic information related to the phosphorus nutrition status is available for species like *Panicum maximum* (Meirelles et al., 1988) and *Brachiaria decumbens* (Monteiro et al., 1995). For *Brachiaria brizantha* and particularly for the Marandu cultivar there is a need of such information.

The objective of this research was to evaluate the response of this cultivar to phosphorus supply, and identify the plant part to be sampled and the respective critical level of phosphorus for diagnostic purposes.

## MATERIALS AND METHODS

An experiment was carried out in a greenhouse. Plastic pots containing ground quartz were used. Seeds were germinated in washed sand and transplanted to the pots. Five plants were grown in each pot.

The nutrient solution proposed by Sarruge (1975) was used. It was modified for phosphorus to supply the seven rates of 0; 0.2; 1; 5; 10; 20 and 40 mg L<sup>-1</sup> of this nutrient. The experiment was set in randomized complete block design, with four replications.

Plants were first harvested 54 days after starting the use of nutrient solution and harvested again after 49 days of regrowth. Tiller number was determined before each harvest. Plant tops were separated into: a) young shoots (YS)- non - expanded leaves; b) young leaf blades (YLB)- blades of the two newly expanded leaves; c) old leaf blades

(OLB)- blades of the other expanded leaves, and d) culms + sheaths (CS) of the expanded leaves. Roots were separated from the substrate after the second harvest. All the plant material was dried in a forced air oven at 65°C until constant weight. Phosphorus concentration was determined colorimetrically in each part sampled using the nitric acid-perchloric acid digestion method according to Sarruge and Haag (1974).

## RESULTS AND DISCUSSION

Phosphorus promoted significant increases in forage yield and tiller number in each harvest and in the root dry weight (Figures 1 and 2). Maximum forage yield occurred at 39 and 33 mg L<sup>-1</sup> of phosphorus in the solution at the first and second harvest, respectively. For root dry weight this maximum was obtained at 33 mg L<sup>-1</sup> of phosphorus. These three phosphorus rates are somewhat higher than those (33; 31 and 30, respectively) found by Monteiro et al. (1995) for *Brachiaria decumbens*. Tiller number did not change up to 1 mg L<sup>-1</sup> of phosphorus, but had the highest value at 40 mg L<sup>-1</sup> in the first harvest and at 20 or 40 mg L<sup>-1</sup> in the second harvest.

Phosphorus concentrations in each sampled part of the grass changed significantly with phosphorus rates in the nutrient solution. The highest correlation coefficients between phosphorus concentration and forage yield were found when the young plant tissues (YS and YLB) were sampled. Taking into consideration that YLB would be easy to sample, the use of this plant part is suggested for diagnostic purposes. A proposed critical phosphorus concentration (equated to 90% of maximum yield) in this plant tissue is 1.2 g kg<sup>-1</sup>. This value is lower than those proposed by Meirelles et al. (1988) for *Panicum maximum* (1.6 to 1.9 g kg<sup>-1</sup>), by Monteiro et al. (1995) for *Brachiaria decumbens* (1.5 g kg<sup>-1</sup>) and by Corrêa (1991) for *Brachiaria brizantha* (1.6 to 1.7 g kg<sup>-1</sup>).

## REFERENCES

- Corrêa, L.A.** 1991. Níveis críticos de fósforo para o estabelecimento de *Brachiaria decumbens* Stapf., *Brachiaria brizantha* (Hochst) Stapf. cv Marandu e *Panicum maximum* Jacq. em Latossolo Vermelho Amarelo álico. Dr. Dissertation, ESALQ - University of São Paulo, Piracicaba, Brazil. 83p.
- Meirelles, N.M.F., J.C. Werner, P.L.G. Abramides, J.M. Carriel, V.T. Paulino and M.T. Colozza.** 1988. Nível crítico de fósforo em capim-colônia cultivado em dois tipos de solo: Latossolo Vermelho-Escuro e Podzólico Vermelho-Amarelo. B. Indústr. Anim. **45**: 215-232.
- Monteiro, F.A., W.T. Mattos and R.A. Martim.** 1995. Partes das plantas e diagnose nutricional de fósforo em braquiaria decumbens. 25º Congr. Bras. Ciência do Solo, Resumos expandidos, Viçosa, MG, pp. 556-557.
- Nunes, S.G., A. Boock, M.L.O. Penteado and D.T. Gomes.** 1985. *Brachiaria brizantha* cv. Marandu. EMBRAPA-CNPQC, Campo Grande, MS, 31p. (Documentos, 21).

Sarruge, J.R. and H.P. Haag. 1974. Análises químicas em plantas. Piracicaba, SP, Departamento de Química, ESALQ-USP. 56p.

Sarruge, J.R. 1975. Soluções nutritivas - nova técnica. Summa Phytopathologica. 1: 231-233.

Valle, C.B. and J.W. Milles. 1994. Melhoramento de gramíneas do gênero *Brachiaria*. 11<sup>o</sup> Simp. Manejo da Pastagem, Piracicaba, SP, pp. 1-23.

Werner, J.C. 1994. Adubação de pastagens. Nova Odessa, Instituto de Zootecnia, Nova Odessa, SP, 49p. (Boletim Técnico, 18).

Figure 1

Effect of phosphorus rates on plant top (first and second harvest) and root dry matter of *Brachiaria brizantha*.

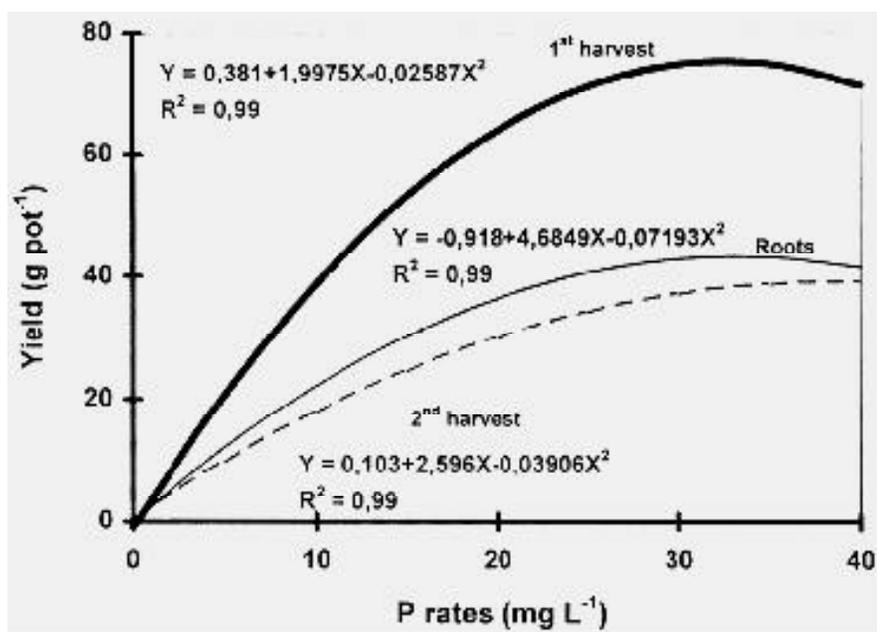


Figure 2

Tiller number of *Brachiaria brizantha* in response to phosphorus rates, at the two harvests.

