# English Version


## Abstract

The increasing industrialization and agriculture in Brazil has promoted the generation of waste in significant amounts for the occurrence of environmental impact. However, these same residues, when managed under a scientific basis, could be used as raw material in food production. The present study aimed to evaluate the effect of foliar application of cow urine in the initial growth of *Tabebuia impetiginosa*. The experiment was conducted in a completely randomized design with seven treatments. Five treatments were set through the dilution of dairy cow urine in water to obtain concentrations 1, 2, 3, 4 and 5% (v/v), and additional urine and the lack of foliar fertilization with a 0,3% nitrogen, with four replications. At the dose 0% (pure water), it was administered only water. The dilutions were prepared by diluting urine into pure water moments before its application to the plants. The stored urine was applied in treatments of the initial period up to 75 days after collection. The foliar fertilization with the concentrations of urine and urea was performed at the same time when it was made the measurements of height and diameter. The use of cow urine at concentrations exceeding 3% provides an increase in the development, growth, dry matter production of shoot, root and total dry mass of plants from *Tabebuia impetiginosa* compared to conventional mineral fertilizer (urea 0.3% N).



**Key words:** agroecology; forest sustainability; native forestry; agroindustrial residues


# Increase in the development of plants of purple ipê (*Tabebuia impetiginosa*) in function of the foliar fertilization with cow urine in the Southwest area of the Legal Amazon


*Rubens Ribeiro da Silva[1], Gilson Araujo de Freitas[2], Aurélio Vaz de melo[2], Miréia Aparecida Bezerra Pereira[3], Antônio Carlos Martins dos Santos[3], Josilene Silva Rocha[4], Joenes Mucci Peluzio[2]*


## Introduction

The expansion of the industrialization and agriculture in Brazil has promoted the generation of waste in significant amounts, which can favor the occurrence of environmental impact. However, these same residues, when managed under a scientific basis, could be used as raw material in agricultural and forest production. The cow urine, besides providing nutrients as potassium and substances beneficial to the plants, is a cheap input (FERREIRA, 1995) and easy to acquire by the rural producer (PESAGRO, 2002).

Applied in several vegetables, the cow urine has presented positive results which indicate its potential to be used, mainly, as fertilizer, besides the protective and stimulating effect of plant growth (GADELHA, 1999; PESAGRO-RIO, 2002).

CARRAN et al. (1982) observed that the application of cow urine stimulated the growth of the pasture, and SAUNDERS (1984) verified that, in the place where it was deposited, the cow urine made the pasture greener. WILLIAN et al. (1989) observed that the quantity of potassium deposited in pasture during one year was equivalent to the application of one tonne per hectare of potassium ($K_20$). MARTUSCELLO et al. (2002) applied volume of urine equivalent to 60 kg $ha^{-1}$ of N in the cultivation of elephant grass (*Penninsetum purpureum* Schum.) and verified an increase in the productivity of fresh and dry biomass and in the number of tillers and leaves, both in the first and in the second cutting.

However, it is still scarce the results of researches about the use of cow urine as fertilizer, mainly referent to its use in the fertilization of forest species native to the Legal Amazon. This residue could contribute to the production of seedlings of good quality and low cost (BRASIL, 1999). To CARNEIRO (1995), the development of seedlings


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1 Professor, Dr. Universidade Federal do Tocantins (Federal University of Tocantins), campus of Gurupi, Tocantins

2 Student of the Master's degree in Vegetal Production, Universidade Federal do Tocantins (Federeral University of Tocantins)

3 Student of the course of Agronomy of the Universidade Federal do Tocantins (Federal University of Tocantins), campus of Gurupi, Tocantins

4 Student of the course of Environmental Engineering of the Universidade Federal de Viçosa (Federal University of Viçosa)

is influenced basically by the quantity of fertilizers and by the existent availability of nutrients.

The purple ipê (*Tabebuia impetiginosa* Mart. ex DC. Standl.) is an arboreal Bignoniaceae, which reaches eight to twenty meters of height, presenting characteristics of a deciduous plant (LORENZI, 2002). It can be found in secondary vegetation, which covers capoeiras and capoeirões[1] (LONGHI, 1995). The species have economic, ornamental and medicinal value, and has been increasingly scarce to find it in natural environment, due to predatory exploitation (ETTORI et al., 1996). The purple ipê is in the relation of the species which must be conserved genetically (SIQUEIRA e NOGUEIRA, 1992).

According to SCHNEIDER et al. (2000), information about technical recommendations in the production of seedlings of *T. impetiginosa* are practically non-existent.

In this context, the objective of this work was to verify the effect of the foliar application of cow urine in the initial development of plants of purple ipê (*Tabebuia impetiginosa)*.

## Material and Methods

The work was conduced in the period from February to June 2007, in the experimental area of the Universidade Federal de Tocantins (UFT – Federal University of Tocantins), University campus of Gurupi, located in the south region of the State of Tocantins, in altitude of 280 m, in the localization 11°43'45" S and 49°04'07" W.

The seeds were collected in thirty matrix plants selected concerning vegetal sanity after the dispersion of at least 30% of the total volume of the seeds which fell to the soil. Later to the collection, the seeds were transported to the Seed Laboratory of UFT, where they were submitted to a protocol of asepsis (SILVA et al., 2003).

The seeds were placed to germinate in a bed of washed sand, located in a greenhouse covered with shading screen with 50% of sunlight passage. The use of a covered environment avoided the leaching of the nutritive solution, by action of possible rain.

When they presented three leaves, they were transplanted to polyethylene bags with 0.28 m of height and 0.15 m of diameter, containing approximately two $dm^3$ of organic substrate. The chemical composition of the substrate used in the development of the plantlets was: pH ($CaCl_2$) – 5.2; Organic Matter – 47 g $kg^{-1}$; Calcium – 3.25 cmol $dm^{-3}$; Magnesium – 4.28 cmol $dm^{-3}$; Aluminum- 0.39 cmol $dm^{-3}$; Hydrogen$^+$ Aluminum- 3 67 cmol $dm^{-3}$; Potassium - 39,1 mg $dm^{-3}$; Phosphorus – 14.8 mg $dm^{-3}$. In the characterization of the cow urine used in the conduction of the work it was obtained: Nitrogen – 19.98 g $kg^{-1}$; Phosphorus – 0.0071 g $kg^{-1}$ e Potassium - 7,06 g $kg^{-1}$; Calcium – 0,28 g $kg^{-1}$; Magnesium – 0,89 g $kg^{-1}$.

The experiment was conducted in completely randomized experiment design with seven treatments and four replications. Five aqueous suspensions with cow urine in the concentrations of 1, 2, 3, 4 and 5% (v/v), one conventional treatment with foliar fertilization based on urea (0.3%) as the nitrogen source and the control, in which it was only applied water (pure water).

The urine used was collected in a single occasion of eight cows in lactation, right after they were homogenized and it passed trough a period of rest of three days. The storage was performed in a disinfected plastic pump, maintained closed in aerated place to avoid the loss of ammonia. The applications were performed each 15 days during 75 days. The dilutions to obtain the treatments were prepared in distilled water, moments before its application in the plants.

The spraying of urine was effected in the period of the morning with manual spray with capacity for two liters, with a pattern of the correspondent value (1400 mm) in each treatment. In order to avoid the drifting of the solution to the other treatments, the plants were distanced in one meter and it was used cardboard sheets to the individualization of the parcels.

The evaluation of the height and diameter of the plant collar was performed each 15 days, with a total of five evaluations. They were made in the same occasion in which it was made the treatment spraying.

The difference of the growth among the treatments was evaluated by the calculation of the dry biomass of plants, which were separated in

1 Brazilian name of a secondary vegetation.

shoot and root, in the last evaluation of growth (75 days). It was used tap water to remove the substrate adhered to the roots. This operation was performed over a sieve with fine mash, in order to avoid the loss of roots (MORAES NETO et al., 2000). The weight was made individually in electronic analytic weight and plants were placed in paper bags, being properly identified and placed in over with forced air circulation, at approximately 70 °C, during 72 hours.

The values obtained from the replications to variable were submitted to the analysis of variance (F test) and adjusted the equations of regression, using the software Sisvar.

## Results and discussion

The plant height did not present difference in function of the concentration of the cow urine. However, it was observed that the effect of the foliar fertilization with concentration superior to 3% was superior to urea, the conventional fertilizer (Figure 1). ALDRIGHI et al. (2002) obtained promising results with use of cow urine in the growth of tomato seedlings. CARRAN et al. (1982) and SAUNDERS (1984) also observed positive effects concerning the use of urine in the growth of pasture.

The cow urine, since it is a natural input constituted by several substances which may act either in the phytossanity or as improvement of the plant nutrition, is characterized as an alternative to the use of this residue as raw material in the elaboration of organic fertilizers.

In the highest concentrations of cow urine (3%, 4% and 5%), the plants obtained higher growth in height, probably due to the presence of nutrients essential to the plant growth, mainly Nitrogen (Nitrogen – 19.98 g $kg^{-1}$; Phosphorus– 0.0071 g $kg^{-1}$ and Potassium – 7.06 g $kg^{-1}$; Calcium – 0.28 g $kg^{-1}$; Magnesium – 0.89 g $kg^{-1}$. BUCKMAN e BRADY (1976) found, in the composition of cow urine, water (92%), N (1.00 dag $L^{-1}$), $P_2O_5$ (traits) and $K_20$ (1.35 gad $L^{-1}$). Also GADELHA (2001) reports high content in the cow urine of nitrogen, potassium, chlorine, sulfur, sodium, phenols and indoleacetic acid. Even tough the cow urine contains almost all the nutrients that the plant needs, potassium is its main compound (PESAGRO-RIO, 1999; 2002; GADELHA et al., 2003).

The increase in the concentration of cow urine used in the foliar fertilization provided increases in the development in collar diameter of the *T. impetiginosa*. The plants which received application of urine in the highest concentrations (3%, 4% and 5%) presented higher development, surpassing the effects observed by the treatment with conventional nitrogen source (Figure 2).

It was observed a larger production in dry matter, both for roots and shoots, in plants which received foliar fertilization with concentration

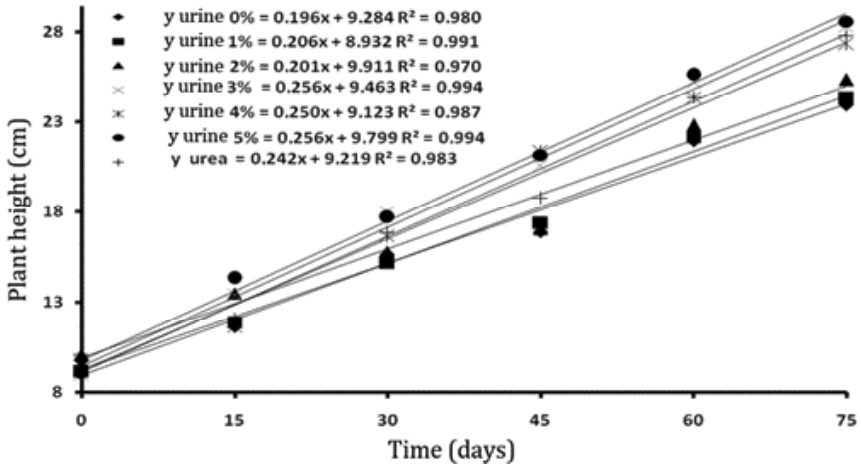


**Figure 1.** Plant height of *Tabebuia impetiginosa* during 75 days of growth in function of the application of different concentrations of cow urine. Gurupi – TO, 2010.

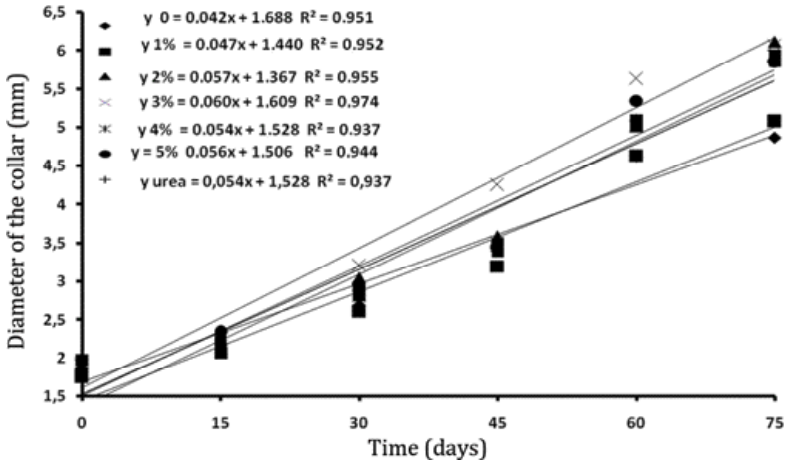


**Figure 2.** Diameter of the collar of *Tabebuia impetiginosa* plants in function of the application of different concentrations of cow urine.

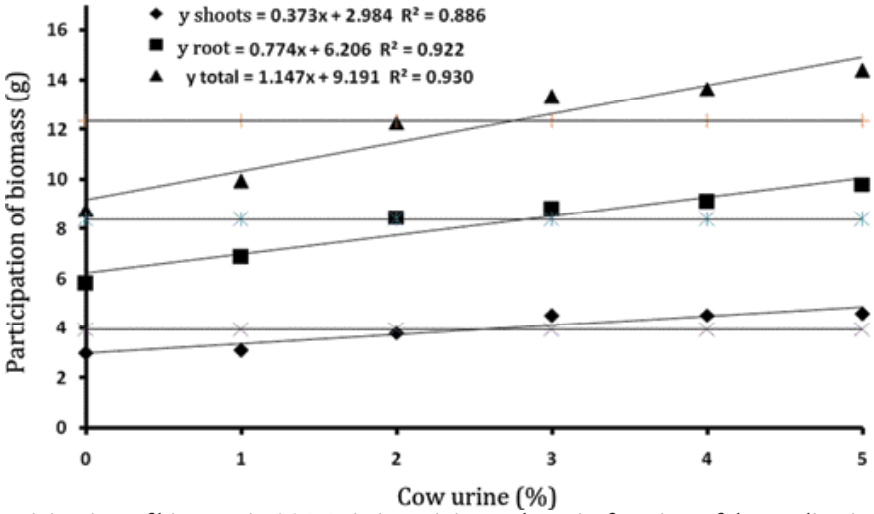


**Figure 3.** Participation of biomass in *Tabebuia impetiginosa* plants in function of the application of different concentrations of cow urine.

of urine superior to 3% (Figure 3). The larger production is possibly related to the fact that the urine is rich in nitrogen, potassium and a substance known as priocatecol, an amino acid that, according to FERREIRA (1995), acts in the nutrition and in the phytossanity of the vegetables. BURGER and MAYER (2002) showed that the cow urine reduced the susceptibility of okra to the attack of a powdery mildew fungus, which reduced the use of fungicides in that crop.

The increase in the production of vegetal mass was also verified by GADELHA et al. (2003) in the state of Rio de Janeiro, with the application in the soil of 20 mL plant$^{-1}$ of the solution of cow urine at 0.86% (v/v). The increase was of 10.32% in the fresh matter of lettuce plants in relation to the control. OLIVEIRA et al. (2003), with spraying of solutions of cow urine in the concentrations from zero to 5%, obtained linear increase in the production of fruits, reaching 10.7 t ha$^{-1}$ in pepper, with the use of the

concentration of 5%.

## Conclusion

The use of the cow urine in concentration superior to 3% provides an increase in the development in height, collar diameter and dry biomass of plants of *Tabebuia impetiginosa* in relation to the conventional mineral fertilization.

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