Original Research Article

Different nitrogen fertilization in Jabuticaba seedlings

ABSTRACT

Aims: The objective of this research was to evaluate the seedling development of Jabuticaba when submitted to different nitrogen fertilizations in two periods of development at greenhouse.
Study design: The experimental design was of random blocks.
Place and Duration of Study: The work was conducted in a greenhouse of the Pontifical Catholic University of Paraná, located in the city of Toledo - PR.
Methodology: the seedlings were planted in pots filled with 25 liters of soil at 14 days before the treatments were implanted, they had the stem diameter and height measured to the initial development data which was used to posterior comparison with the final development. Were tested five treatments, using the mineral fertilizer Super N (45% of nitrogen): without nitrogen fertilization; 30 kg/ha of N (40mg/dm³); 60 kg/ha of N (70 mg/dm³); 120 kg/ha of N (140 mg/dm³), each treatment had four repetitions, totalizing 20 pots.
Results: Elevated doses of nitrogen actin a variated way stimulating the development with specific characteristics of the evaluated plant. The nitrogen contents (Figure 3) show a linear growth at 30 days, reaching its apex in the sample submitted to 90 kg of nitrogen and then decreasing from this point and it stabilizes after 60 days, obtaining comparable results in all treatments. The protein production is directly linked to the presence of nitrogen in the vegetal organism, so, high doses provide a greater availability of prime matter to the cell, being that, the final stage of maturation is when the fruits accumulate the maximum of protein.
Conclusion: The nitrogen fertilization influence on the development of Jabuticaba seedlings. Higher concentrations decrease the availability of other nutrients, leading to a foliar yellowing, causing losses in the development and productivity of the seedling. Doses of 60 kg/ha are adequate for full development of Jabuticaba seedlings.

Keywords: Plinia cauliflora, development, fruit, fertility.

1. INTRODUCTION

The Jabuticabas are known from Pará until Rio Grande do Sul, being that a plant of humid tropical and subtropical weather that cannot survive in conditions of long dry periods and strong frosts (LORENZI, 2014). It is a fruit type tree of slow growth, produces heavy, compact and resistant wood. It's fruits are appreciated in all country, consumed in natura or processed in many different products such as juice, jelly, liqueur, vinegar, medical teas, and others (GOMES; ROGERIO; GOMES, 2007).

The success of an orchard is directly linked to different factors, from edaphoclimatic conditions until the seedling choice, among all them the fertilization is highlighted. As a hard propagation crop, due to its delay in vegetative and sexual propagation, the jabuticabas demand a effective care in their nutritional characteristics, ensuring a good response from the used seedlings (DANNER et al., 2006).

The fertilization is of high importance to the vegetal development, where, when adequate, promotes gains in productivity and yield quality and, when associated to other practices, increases the life time of the orchard (ABREU et al., 2005; DALANHOL et al., 2012).

The nitrogen is the main element for the plants during its cycle. It participates in the protein composition, main component of the vegetal cell cytoplasm, besides the participation on the composition of the nucleic acids, it is present in all the stages of the crop development (LEAL et al., 2008).

Each crop needs specific quantities of nutrients, so, different doses allow the evaluation of the seedling potential when submitted to field conditions, where the competition for water, light and nutrients are determinant factors to the establishment and survival of the individuals (LEITE et al., 2010).

Mineral fertilizes are necessary during all the development stages on the plant, in different quantities, and in the initial ones for the establishment of the plant. A young plant can reduce its development in a different nutritional condition, so that the subsequent applications are not effective as verified in properly fertilized plants from the beginning of their formation (TRANI et al., 2013).

Being one of the limiting nutrients to the vegetal development, the nitrogen acts stimulating the vegetative development of the vegetal organism, actin in processes that allow the expression of the maximum yield potential of these crops (BAESSO et al., 2005).

Besides knowing the excess or deficit in the use of nitrogen compounds, correcting them aims at better characteristics in the development and yield, as in quality and quantity of fruits as in a better use of the acquired fertilizers. The objective of this research was to evaluate the seedling development of Jabuticaba when submitted to different nitrogen fertilizations in two periods of development at greenhouse.

2. MATERIAL AND METHODS

The work was conducted in a greenhouse of the Pontifical Catholic University of Paraná, located in the city of Toledo - PR. Plinia caulifora seedlings were purchased commercially from the city of Cascavel - PR, at a development stage of 45 days after emergence.

Were filled 20 polyethylene pots of 25 liters with the soil of the experimental area classified as Dystroferric Red Latosol (EMBRAPA, 2006), rich in organic matter, been each pot an experimental parcel. One sample of soil was collected and forwarded to analysis, the results showed that was not necessary a precious correction of the soil.

Were tested five treatments, using the mineral fertilizer Super N (45% of nitrogen): without nitrogen fertilization; 30 kg/ha of N (40mg/dm³); 60 kg/ha of N (70 mg/dm³); 120 kg/ha of N (140 mg/dm³), each treatment had four repetitions, totalizing 20 pots.

The experimental design was of random blocks, the seedlings were planted 14 days before the treatments were implanted, they had the stem diameter and height measured to the initial development data which was used to posterior comparison with the final development. At 14 days was applied the referent doses of each treatment in the top of the soil. The plants were irrigated (morning and afternoon) and the weed control was made by pulling the weeds from the soil when necessary.

The analysis and collections were performed at 30 and 60 days after the crop was implanted. Was evaluated: plant height, stem diameter. Were collected leaves, which were sent to dry in an oven of forced circulation air at 65ºC for 72 hours to posterior analysis of accumulation of foliar nitrogen.

The data were submitted to variance analysis and then the means of the qualitative data were compared by the Regression test, at the 5% probability level. The analyzes were performed by the SISVAR program (FERREIRA, 2010).

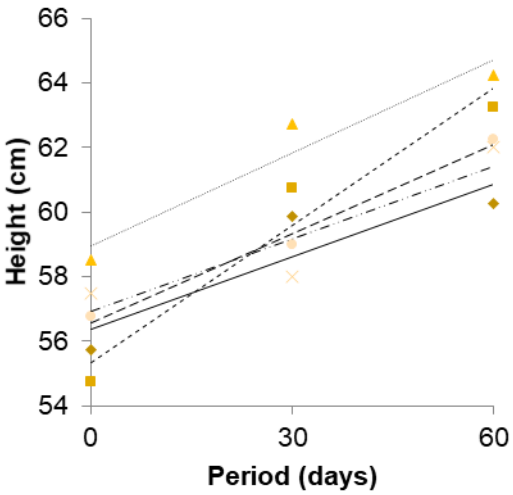
3. RESULTS AND DISCUSSION

The Figure 1 shows the development of Jabuicaba seedlings in three distinct periods (0, 30, 60 days) comparing the plants development along the time when submitted to different nitrogen doses. According

to the increase of the inital nitrogen doses (0, 30, 60 kg/ha) the plants showed a higher development in height, however, higher doses (90 and 120 kg/ha) demonstrated a reduction in the development.

The plant is capable of metabolize a big quantity of nitrogen in its organism, however the excess can harm its development. The absorption in excess mainly of ammonium (NH4+) can be toxic to the vegetal metabolism even in small quantities, harming the water flux from the roots to the aerial part, causing wilting of non-tolerant plants (SOUZA; FERNANDES, 2006). Among the ammonium toxicity symptoms is the reduction in the development of the affected plants as it happens in this work.

Brunetto et al., (2007) mention on its experiment that high dosis of nitrogen in peach plants did not influence directly in the plant development, but in its capacity of accumulation of the nutrient and in the quantity of the element on the leaves, which reflects in an increase of the nutritional content of the fruit, resulting in an higher yield and quality at the end of the harvest.



♦ - y = 0,075x + 56,367
R² = 0,8161

■ - y = 0,1417x + 55,333
R² = 0,9465

▲ - y = 0,0958x + 58,958
R² = 0,9292

× - y = 0,075x + 56,917
R² = 0,8322

● - y = 0,0917x + 56,583
R² = 0,9891

Figure 1 Aerial development of Plinia cauliflora plants at the doses of 0 (♦ □), 30 (■ -------), 60 (▲□□□□□□□□□), 90 (× -□□-□□-□□) and 120 (● - - - - - -) Kg/ha of nitrogen in different periods.

In plants submitted to higher doses (90 and 120 kg/ha) It can be observed in visual analysis yellowing of the older leaves, where two possibilities apply: possible potassium deficit, which is highly demanded for the plant and in higher concentration of nitrogen, directs its reserves to the younger leaves causing the yellowing on older leaves or else chlorosis resulting from ammonium toxicity was expected to alter soil concentrations (FERNANDES, 2006; MEURER, 2006; SOUZA; NEVES et al. 2007; TAIZ; ZEIGER 2013).

As the variable stem diameter (Figure 2), it is noticed again a better development characteristic at the doses of 60 kg/ha, however, the stem development is slower when compared to height.

Still, different from the previous variable, even in higher doses of nitrogen suffering a decrease in the development, all the values had showed higher values than the control. Vertical development for plants can provide a decrease in the stem diameter in its initial development, leaving the secondary development (stem thickening) for after its full establishment (BARBOSA; SANTIAGO, 2015).

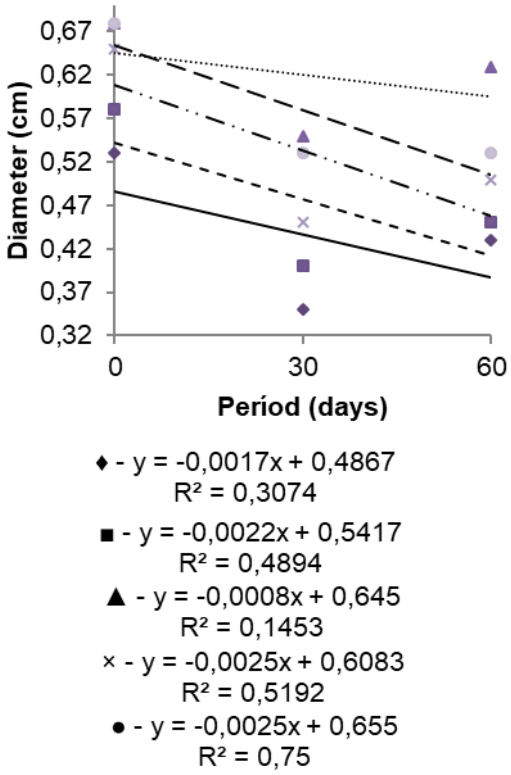


Figure 2 Stem diameter of Plinia cauliflora plants at the dosis of 0 (♦ □), 30 (■ -------), 60 (▲□□□□□□□□□), 90 (× -□□-□□-□□) e 120 (● - - - - - -) Kg/ha of nitrogen in different periods.

Dias et al., (2012), working with guava seedlings and nitrogen and potassium fertilization obtained positive results in relation to nitrogen fertilization to the parameters of stem diameter and height, being the ideal doses between 552 and 1104 mg/dm³. In this research, the better doses were between 40 and 70 mg/dm³ of nitrogen, showing a smaller need of this element from a Myrtaceae.

Elevated doses of nitrogen actin a variated way stimulating the development with specific characteristics of the evaluated plant. Picolotto et al., (2012), working with different nitrogen doses in blueberry in pots highlight that doses over 10 g/plant can retract the vegetative development and consequently the quality of the fruits of this crop.

The nitrogen contents (Figure 3) show a linear growth at 30 days, reaching its apex in the sample submitted to 90 kg of nitrogen and then decreasing from this point and it stabilizes after 60 days, obtaining comparable results in all treatments. Leite et al., (2010) in their study with Syzygium cumini seedlings found that the nitrogen fertilization increases the quality of the produced seedlings, however, higher doses promote a depressive effect on the plant.

Ferreira (2014) concluded that acerola seedlings obtained higher morphological parameters in doses of 600 mg dm-3 of nitrogen fertilization and high rates of nutrient accumulation in the aerial part, specially N, Ca and Mg.

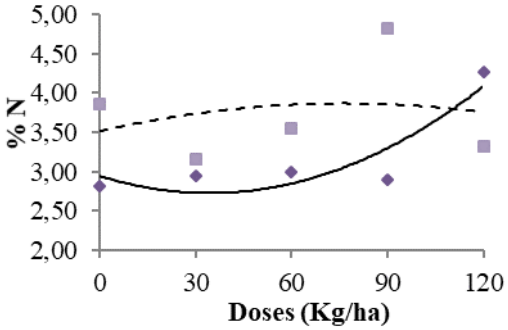


Figure 3 Total Nitrogen content in Plinia cauliflora plants submitted to different fertilizations and evaluated at 30 (♦□) e 60 (■ ------) days after transplant.

The protein production is directly linked to the presence of nitrogen in the vegetal organism, so, high doses provide a greater availability of prime matter to the cell, being that, the final stage of maturation is when the fruits accumulate the maximum of protein which is essential to the quality at the harvest (SOUZA et al., 2005), besides the characteristic of response to pathogens or situations of biotic stress, where the defense mechanisms of the plant are directly related with the production of specific proteins.

Parameters related to the soil fertility are among the main constraints of the vegetal production and development. Studies focused on the fruit in question are scarce, and it is necessary to delve into the subject through further research.

4. CONCLUSION

The nitrogen fertilization influence on the development of Jabuticaba seedlings.
Higher concentrations decrease the availability of other nutrients, leading to a foliar yellowing, causing losses in the development and productivity of the seedling.
Doses of 60 kg/ha are adequate for full development of Jabuticaba seedlings.

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193