Use of growth regulator and number of applications in growth of grumixameira seedlings

Gustavo Aniz Amaral¹, Saul Mateus Nantes Pereira² Cleber Junior Jadoski³, India Mara Sgnaulin⁴, Hélio Ávalo⁵, Denilson de Oliveira Guilherme⁶

¹Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil
²Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil
³Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil
⁴Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil
⁵Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil
⁶Universidade Católica Dom Bosco / Mato Grosso do Sul / Brazil

Abstract: This work was developed with the objective of evaluating growth of grumixama seedlings, treated in different concentrations of growth regulator and times of application. The experimental design was a randomized complete block design in a 6 x 2 factorial scheme with three replications and one plant per plot. The doses consisted of the growth regulator concentrations of 0.0, 5.0, 10.0, 15.0, 20.0 and 25.0 ml L⁻¹ of the product in one liter of water. The application times were 10 and 20 days after the transplanting of the grumixameira seedlings to plastic bags of 3 dm³. The evaluations of height, stem diameter and number of leaves were performed every 30 days. At 100 days after transplanting of the seedlings, root volume, root dry matter and shoot dry matter were evaluated. It was concluded that for both variables there was no significant difference in the analyzed variables.

Keywords: Time; Giberellin; Hormone.

II. Materials And Methods

The experiment was carried out in Campo Grande - MS, Brazil, under geographic coordinates 20°23′14″ south latitude and 54°36′29″ west latitude, at 532 meters altitude.

The experiment was conducted in a randomized complete block design in factorial scheme 2 (application times) x 6 (growth regulator doses). Two seasons were used for the application of a growth regulator at 10 days after transplanting, and another at 20 days after transplanting. The doses of growth regulator consisted of concentrations: 0 ml L⁻¹; 5 ml L⁻¹; 10 ml L⁻¹; 15 ml L⁻¹; 20 ml L⁻¹ and 25 ml L⁻¹. The growth regulator was applied at concentrations of 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 mg L⁻¹.
Use of growth regulator and number of applications in growth of grumixameira seedlings

The treatments consisted of the combination of the factors of age x doses of growth regulator totaling 18 treatments. Each treatment had three replicates.

The seeds of grumixameira were collected from seedlings located on the School Farm of the Dom Bosco Catholic University and sown on December 5, 2016. Germination occurred on December 21, 2016 with 90% germination. At 63 days after germination (DAG) were transplanted into plastic sachets for 12cm x 25cm seedlings filled with the substrate base of pine bark plus additions of minerals super phosphate, limestone and potassium chloride.

The daily irrigation was of the micro sprinkler type with daily irrigation shift with irrigation schedules 7h, 9h, 13h and 16h with average flow of 900L h⁻¹. The application of the increasing doses of the growth regulator consisted of all the two seasons was by means of sprayer in the aerial part of the plants done at dusk, aiming to use greater efficiency of the product and its degradation with the solar rays.

The evaluations consisted of plant height: measured from the neck region to the apex of the seedlings by means of a millimeter ruler. Diameter of the stem: measured at 5 cm above the top of the seedlings by Universal Digital 150mm Zaas 1,0004 caliper. Two measurements were made in opposite directions of the cardinal points and later the mean was realized for correction of stem distortions. Number of leaves: obtained by means of direct counting of the emerged leaves on the stem of the seedlings. Root dry mass: the roots were placed to dry in a greenhouse with forced air circulation at 70 °C for 62 hours, toobtain the dry mass. Dry mass of the area: the leaves were dried in a greenhouse with forced air circulation at 70 °C for 62 hours, toobtain the dry mass.

The data were submitted to analysis of variance and the means of the treatments compared by the Tukey test at the 5% level using the SISVAR® program [9].

III. Results And Discussions

At 60 days after the installation of the experiment, it was observed that the height of the grumixameira seedlings remained partially equal in all treatments. When performing the analysis of variance, it was observed that the interaction between the factors of growth regulator and application time was not significant for the plant height parameters (figure 1).

Figure 1: Height of grumixameira seedlings as a function of growth regulator dosages and different times of application

When working with a growth regulator effect on Passiflora alata CURTIS, [10] observed that gibberellin was less effective in increasing height using 64mgL⁻¹ of GA4. The cytokinins and gibberellins according to the work of [10] may have acted synergistically, in cell division and stretching, respectively, which resulted in greater growth.

After the transplanting of the seedlings, when evaluating the grumixameira seedlings, it was observed that for the different dosages of growth regulator did not have significant difference in height.
According to [10] the analysis of gibberellic acid in the initial growth of peach tree seedlings had a positive effect on the growth of the same, using the dose of 200 mg L\(^{-1}\), but spraying GA3 had no effect on the diameter of the peach tree.

The dosages of 10 and 15 ml per liter of growth regulator in the first application already had a difference in the diameter of the seedlings, compared to the others, the second application the diameters remained partially equal, however, the control that received no dosage of regulator of growth and had greater thickening of the stem in relation to the other dosages, the dosage of 20 ml of growth regulator had a reduction in the stem in the second application (Figure 2).

![Figure 2: Diameter at different doses of growth regulator at two application times.](image)

It was observed that after the application of growth regulator the dose of 15 ml was maintained at the highest mean diameter. In analyzing the work done by [10], the use of plant regulators allowed an increase in the values of the diameters, which, in practical terms, can leave the seedlings in a point of grafting.

A greater number of leaves were observed for the 10 and 15 ml dosages compared to the other treatments after application at 10 days. In the application at 20 days there was a uniformity in the number of leaves at both dosages (Figure 3).
Use of growth regulator and number of applications in growth of grumixameira seedlings

Figure 3: Number of leaves, relative to the different times of application in different dosages of growth regulator.

Works using effects of plant regulators on the development of Passiflora alata CURTIS seedlings, the effects of regulators were not significant for mean number of leaves [10]. Treatments containing cytokinins alone demonstrated the effect of cytokinins on cell division, induction of sprouting on lateral buds, and also on the accumulation of chlorophyll in the leaf. [11].

IV. Conclusion

In view of the presented results it was observed that:

Growth regulator doses did not present significant results for seedling size, root dry matter, root volume, and shoot dry matter. However, it was observed that in the 10 and 15ml L-1 doses the seedlings had higher growth.

The application times of the growth regulator did not have significant results for seedling size, diameter, number of leaves, root dry matter, root volume, and shoot dry matter.

At 60 days after transplanting, widespread chlorosis was observed in the seedlings culminating with the death of the plants.

Bibliography