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ÁREA FOLIAR DE MUDAS DE CAJUEIRO CULTIVADAS EM SUBSTRATOS ORGÂNICOS

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RESUMO: A cajucultura possui grande expressão nacional e, o estado do Ceará é o principal produtor do Brasil. Objetivou-se com este trabalho avaliar a influência de diferentes substratos no desenvolvimento inicial de mudas do cajueiro, avaliando a área foliar das plantas. O delineamento experimental utilizado foi o de blocos completos ao acaso, em esquema simples com seis tratamentos (solo; T2- solo com esterco caprino; T3 – solo com esterco bovino; T4 – solo com serragem; T5 – esterco caprino com serragem; T6 – esterco bovino com serragem) e cinco repetições. As mudas de cajueiro foram cultivadas em tubetes de 150 mL e mantidas em ambiente a pleno sol. As irrigações foram realizadas diariamente de forma manual, mantendo o substrato sempre na capacidade de campo. Os dados obtidos foram submetidos a análise de variância (P<0,05) e, quando significativo, as médias dos tratamentos foram comparas pelo teste de Scott-Knott (P<0,05). Ao final do ensaio avaliou-se área foliar média de cada folha e área foliar total da planta. Observou-se que os substratos utilizados para o cultivo não influenciaram na área foliar média e na área foliar total das mudas de cajueiro.

Palavras-chaves: *Anacardium occidentale*, cultivar, variedade.

LEAF AREA OF CASHEW SEEDLINGS CULTIVATED IN ORGANIC SUBSTRATES

ABSTRACT: Cashew cultivation holds significant national importance, and the state of Ceará is the leading producer in Brazil. The objective of this study was to evaluate the influence of different substrates on the initial development of cashew seedlings, with a focus on the leaf area of the plants. The experimental design used was randomized complete blocks in a simple scheme with six treatments (T1 - soil; T2 - soil with goat manure; T3 - soil with cattle manure; T4 - soil with sawdust; T5 - goat manure with sawdust; T6 - cattle manure with sawdust) and five replications. The cashew seedlings were cultivated in 150 mL tubes and maintained in a full-sun environment. Daily manual irrigation was carried out, keeping the substrate at field capacity. The obtained data were subjected to analysis of variance (P<0.05), and when significant, the treatment means were compared via the Scott–Knott test (P<0.05). At the end of the trial, the average leaf area per leaf and the total leaf area

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of the plants were evaluated. The substrates used for cultivation did not influence the average leaf area or the total leaf area of the cashew seedlings.

Keywords: *Anacardium occidentale*, cultivar, variety.

1 INTRODUCTION

The cashew tree (*Anacardium occidentale* L.) is native to Northeast Brazil and has considerable adaptive capacity to low-fertility soils, high temperatures, and water stress. Owing to these characteristics, the cashew tree has become an important source of income for the states of Northeast China (Serrano; Pessoa, 2016). In Brazil, the largest areas with cashew trees are in the states of Ceará, Piauí, and Rio Grande do Norte. According to the IBGE (2018), Northeast China showed a productive decrease of approximately 3.9%. Cashew nut production was 129.3 thousand tons, with Ceará responsible for 54.83%, Piauí responsible for 19.48%, and Rio Grande do Norte responsible for 14.18% (Serrano; Pessoa, 2016).

In the production of cashew seedlings, the main function of the substrates is physical and chemical support (Nomura *et al*., 2008). There are several types of substrates on the market, and the search for alternative substrates for seedling production has increased, aiming at a lower cost of this operation (Nomura *et al*., 2008). The use of high-quality substrates is important for achieving good germination and development of the seedlings (Araújo; Paiva Sobrinho, 2011).

The survival potential of plants in the field depends, among other factors, on the quality of the seedlings used in planting. According to Frade Junior *et al.* (2011), seedling production is one of the most important stages of the production system and is highly dependent on the use of inputs. In addition to the genetic material, the quality of the seedlings also depends on the cultural treatments used in their production, which should have the lowest production cost so as not to increase the price of the seedling sold (Frade Junior *et al.*, 2011).

The leaf area has a strong influence on production and is considered a key point for the growth of production and seedling production practices. Thus, accurately measuring the leaf area of plants is highly important for modern agriculture and has been commonly used in agronomic and physiological studies. Determining leaf area is a parameter that can be used as an indicator of productivity, providing data on the photosynthetic process that depends on the interception of light energy by the leaf (Favarin *et al*., 2002). Given the above, the objective of this study was to evaluate the influence of different substrates on the initial development of cashew seedlings by evaluating the leaf area of the plants.

2 MATERIALS AND METHODS

The experiment was conducted from April to June 2019 at the Federal Institute of Education, Science and Technology of Ceará-IFCE/*Campus* Sobral-CE, under geographic coordinates 3° 41' 01.08" S and 40° 20' 30.76" W, at an altitude of 67 m (Google Earth, 2009).

The experimental design used was a randomized complete block design (RBD) in a simple scheme with six treatments (T1-soil; T2-soil with goat manure; T3 - soil with cattle manure; T4 - soil with sawdust; T5 - goat manure with sawdust; T6 - cattle manure with sawdust) and five replicates. The cashew seedlings were grown in 150 mL tubes and kept in a fully sunny environment.

Irrigation was performed daily manually, always maintaining the substrate at field capacity. At the end of the experiment, the average leaf area (AFM) and total leaf area (AFT) of the cashew seedlings were evaluated.

The data obtained were subjected to analysis of variance (P <0.05), and when significant, the treatment means were compared via the Scott–Knott test (P <0.05). The *software* R: A Language was used. and Environment for Statistical Computing, R version 4.2.2 (R Core Team, 2022) with the following packages: AgroR: Experimental Statistics and Graphics

for Agricultural Sciences, R package versions 1, 3, and 2.

3 RESULTS AND DISCUSSION

The results of the variance analyses (Table 1) clearly revealed that there was no significant effect (P <0.05) on the mean leaf area (AFM) or total leaf area (AFT). The cashew seedlings grown on the different substrates did not differ in terms of the leaf area (Figure 1A and 1B).

Table 1. Summary of analysis of variance with mean square (MS) values, degrees of freedom (DFS), mean leaf area (MLA) and total leaf area (TLA).

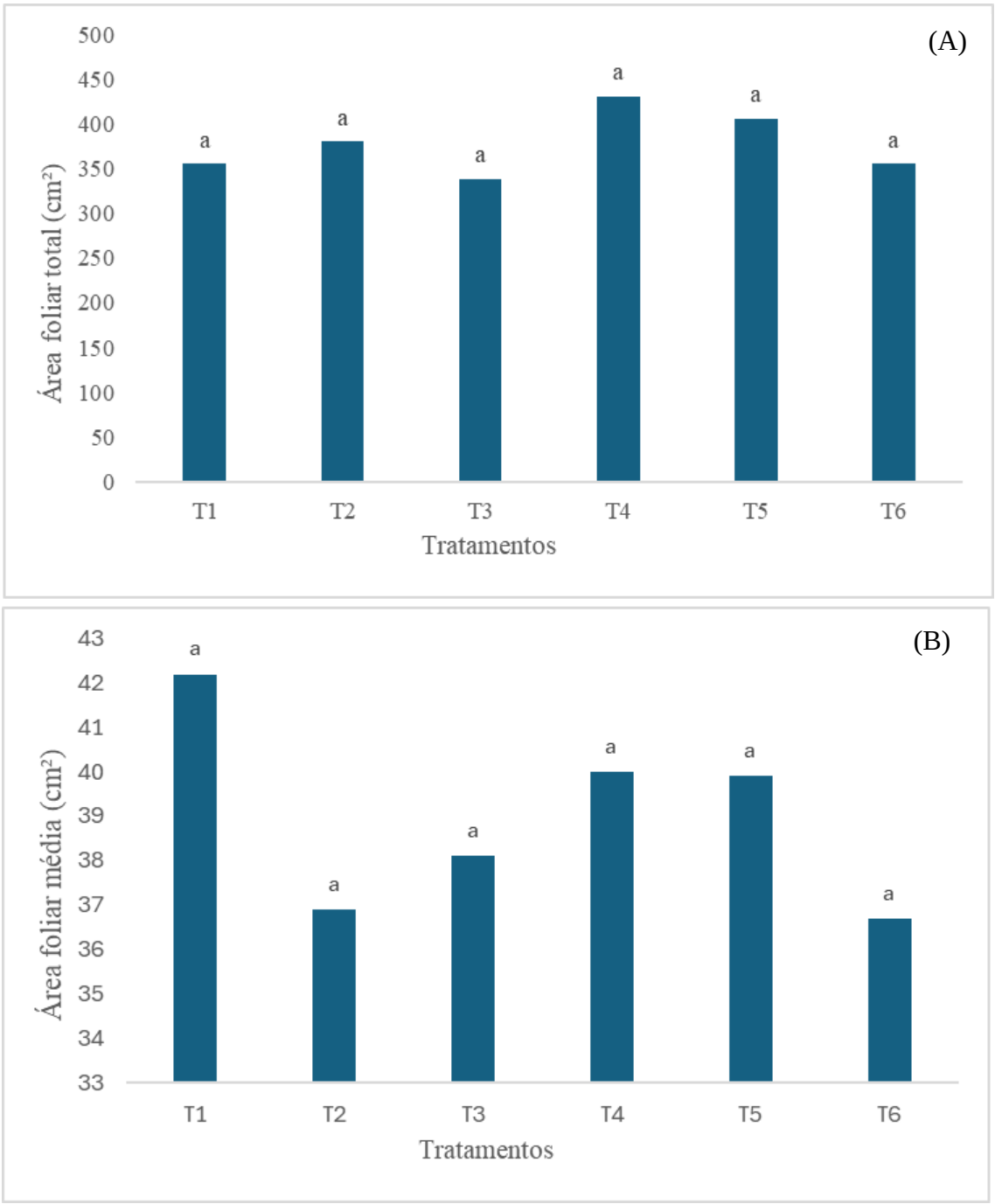
Sources Variation	**GL**	**QM**	
		AFM	**AFT**
Treatment	5	22.4015 ^{ns}	6117.936 ^{ns}
Block	4	164.7095 ^{ns}	18661.217 ^{ns}
Error	20	65.9693	6619.409
Coefficient of Variation (%)		20.85	21.58

^{ns} F value not significant (P >0.05)
Source: Prepared by the authors (2024).

The absence of significant differences can be explained by the adequate physical and chemical characteristics of the substrates evaluated, which ensured good drainage and the availability of nutrients essential for seedling growth.

Previous studies corroborate these findings, highlighting that substrates composed of organic materials, such as manure and plant residues, can offer similar support to the growth of seedlings of various plant species, as long as they present adequate aeration, water retention and nutrient availability properties (Araújo; Paiva Sobrinho, 2011). Similar results were reported by Sousa (2017), who reported that the average leaf area did not significantly differ among treatments with organic substrates.

Figure 1. Average values of total leaf area (A) and average leaf area (B) in cashew seedlings grown on different substrates.



T1-solo; T2- soil with goat manure; T3 – soil with cattle manure; T4 – soil with sawdust; T5 – goat manure with sawdust; T6 – cattle manure with sawdust. The treatment means followed by the same letter do not differ from each other according to the Scott–Knott test at the 5% significance level.
Source: Prepared by the authors (2024).

For the average leaf area, treatment T1 (soil) presented the highest value, whereas the other treatments (T2, T3, T4, T5 and T6) presented lower and statistically similar values. For the total leaf area, there was no significant difference between the treatments, since all the treatments presented statistically similar values. These results indicate that although the soil substrate favored a greater average leaf area, the type of substrate used did not significantly influence the total leaf area of the cashew seedlings.

In studies carried out by Cerqueira *et al.* (2015) on the production of tomato seedlings cv. Santa Cruz on different substrates, the largest average leaf area was observed in plants grown in organic compost, and the highest value was obtained 31 days after germination. As reported by Malaquias *et al.* (2017), in relation to leaf area, cattle manure plus soil provided higher values for this variable. Rangel Junior *et al.* (2020) reported a significant difference in the total and average leaf areas of passion fruit crops between treatments. According to Cabreira, Leles and Alonso (2017), the average leaf area of the substrate soil with cattle manure presented higher values than those of the other treatments in terms of the production of seedlings of forest species. This is a very important variable in evaluating seedling quality, as the amount of photoassimilated matter in a plant is generally proportional to its leaf area (Cavalcante *et al.*, 2016).

A study conducted by Araújo *et al.* (2013) with Formosa papaya revealed that the treatment with cattle manure did not differ from the control in terms of the leaf area, with the substrate being more responsive to only the root length variable, which does not differ statistically from the organic compound. Canesin and Corrêa (2006) did not observe significant differences in relation to the initial growth of papaya seedlings when comparing substrates prepared with cattle manure, mineral fertilizer and cattle manure combined with mineral fertilizer, despite the higher phosphorus contents found in the dry matter of seedlings grown on manure.

The greater proportions of organic matter present in cattle manure and other organic compounds positively affect the physical characteristics of the soil, promoting the aggregation of elementary particles, increasing structural stability and water permeability and reducing evaporation (Cavalcanti, 2008).

4 CONCLUSIONS

There was no variation in the leaf area of cashew seedlings in the initial phase of development, which were grown in different organic substrates.

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