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Infusion of mastic leaves on the physiological potential of *Leucaena leucocephala* seeds

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ABSTRACT

Belonging to the Fabaceae family, Leucaena (*Leucaena leucocephala* (Lam.) of Wit) is a leguminous species native to Central America. The objective of this study was to analyze the influence of the different concentrations of the infusion of mastic leaves (*Schinus terebinthifolius*) on the physiological potential of Leucaena seeds. The experiment was carried out at the Plant Science Laboratory of the Campus of Engineering and Agricultural Sciences of the Federal University of Alagoas (*Universidade Federal de Alagoas*) in Rio Largo-AL. The experimental design was completely randomized, with four replications of 25 seeds per treatment. The seeds of *L. leucocephala* were submitted to different concentrations of mastic leaf infusion, being: 0 (control), 20, 40, 60, 80 and 100g of mastic leaves/liter of distilled water. At high concentrations of mastic leaf infusion, the first variables germination count, germination and germination speed index were negatively influenced. The infusion of the leaves has an allelopathic effect on the physiological potential of *L. leucocephala* seeds at high concentrations.

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RESUMO

Pertencente à família Fabaceae, a Leucena (*Leucaena leucocephala* (Lam.) de Wit) é uma espécie leguminosa originária da América Central. O trabalho teve como objetivo analisar a influência das distintas concentrações da infusão das folhas de aroeira (*Schinus terebinthifolius*) no potencial fisiológico de sementes de Leucena. O experimento foi realizado no laboratório de Fitotecnia do Campus de Engenharias e Ciências Agrárias da Universidade Federal de Alagoas em Rio Largo-AL. O delineamento experimental utilizado foi o inteiramente casualizado, com quatro repetições de 25 sementes por tratamento. As sementes de *L. leucocephala* foram submetidas às diferentes concentrações da infusão de folhas de aroeira, sendo: 0 (testemunha), 20, 40, 60, 80 e 100g de folhas de aroeira/ litro de água destilada. Em altas concentrações da infusão das folhas de aroeira, as variáveis primeiras contagem de germinação, germinação e índice de velocidade de germinação foram influenciadas negativamente. A infusão das folhas da aroeira possui efeito alelopático sobre o potencial fisiológico das sementes de *L. leucocephala* sobre altas concentrações.

Palavras-Chave:
Leucena, germinação, alelopatia.

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Introduction

Leucaena (*Leucaena leucocephala* (Lam.) of Wit) is a leguminous species belonging to the Fabaceae family, originated in Central America (Costa & Santos, 2010), mainly found in tropical and subtropical regions (Seiffert & Thiago, 1983). In Brazil, Leucaena is widely found in the Northeast region due to its excellent adaptation to edaphoclimatic conditions (Sousa, 2005).

Leucaena is being pointed out as an invasive plant problem due to its characteristics attributed to invasive weeds (Costa & Durigan, 2010) which are: Ability to reproduce sexually and asexually, has fast growth, short pre-reproductive period, high plasticity and tolerance to diverse environments (Costa & Durigan, 2010), in addition to its efficient dispersion by various agents.

As a way to reverse the damage of this plant as an invasive plant, another species with allelopathic capacity can be used, making it possible to inhibit the physiological and germination potential, which can help in the control or elimination of it in the environment. The mastic tree (*Schinus terebinthifolius*) is a tree species that reaches up to 7 m in height (Sano, 2015). This species shows signs of allelopathic effects, as laboratory studies have already shown that the leaf extract decreases the percentage of germination (Souza et al., 2007).

However, the evaluation of the germination potential of Leucaena seeds under exposure to mastic is important to observe whether it has inhibitory power in relation to this species, as a form of management in the various environments in which it is found. Thus, the objective of this study was to analyze the influence of the different concentrations of the infusion of mastic leaves (*Schinus terebinthifolius*) on the physiological potential of Leucaena seeds.

Methodology

The study was carried out at the Plant Science Laboratory of the Campus of Engineering and Agricultural Sciences of the Federal University of Alagoas (*Universidade Federal de Alagoas*), located in the city of Rio Largo. *Leucaena leucocephala* (Lam.) seeds from Wit were used under the influence of different concentrations of mastic leaf infusion, being: 0 (control), 20, 40, 60, 80 and 100g of mastic leaves/liter of distilled water. The distilled water was boiled, after extinguishing the fire, the chopped mastic leaves were added, then it was packed to a beaker that was covered and left to rest for 5 minutes. Then, the material was strained and used (this method was repeated for each concentration). Germinated seeds were considered to be seeds with a radicle of 0.25 cm.

The daily germinated seed counts were carried out at the same time for fifteen days and the material was stored in a Biochemical Oxigen Demand (B.O.D.) type germination chamber regulated at a constant temperature of 30ºC.

The variables analyzed were: first germination count, germination and germination

speed index. The experimental design was completely randomized (DIC), with four replications of 25 seeds per treatment. The data were submitted to analysis of variance (ANAVA) and polynomial regression. The analyses were performed with the aid of the SISVAR 5.6 software (Ferreira, 2011).

Results and discussion

The infusions of mastic leaves had an inhibitory effect on leucaena seeds at concentrations above 40g/L. The results were significant at 1% probability in the variables first germination count (PCG), germination (GER) and germination speed index (IVG) (Table 1).

Table 1.

Abstract of the analysis of variance of the variables first germination count (PCG), germination (GER) and germination speed index (IVG) of Leucaena leucocephala (Lam.) of Wit submitted to the infusion of mastic leaves.

FV	GL	Medium square		
		PCG	GER	IVG
Treatment	5	381.14**	682.76**	0.494**
Residue	18	7.25	13.30	0.025
CV (%)		6.78	5.82	22.07

***Significant at 1% probability.*

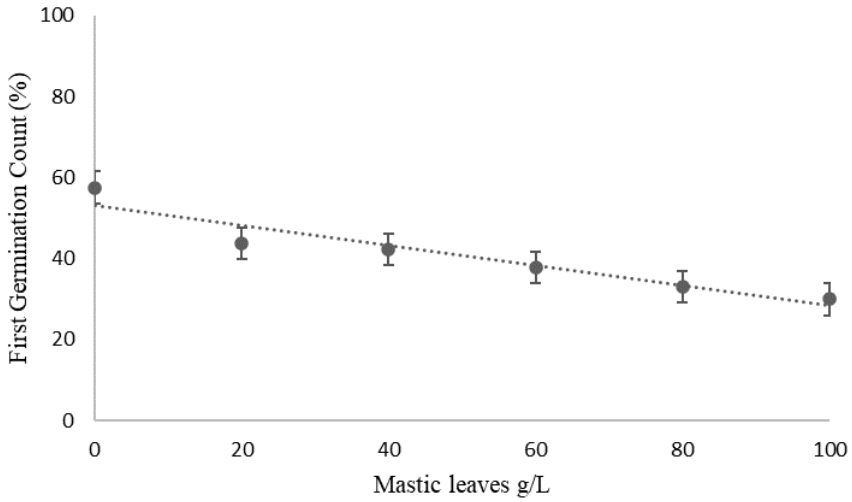
Note: Survey results, 2023.

In the first germination count, the seeds that were submitted to concentrations higher than 50 g/L obtained low germination, as can be seen in figure 1, unlike the control that obtained approximately 60% germination in the first count. This result corroborates the study carried out by Comiotto (2006), who analyzed the influence of aqueous extracts of mastic tree on the germination of achenes and growth of lettuce seedlings, found similar results, where the concentrations of 50 and 100% interfered in the germination of the species studied.

Souza et al. (2007) also obtained similar results, studying the allelopathy of the aqueous extract of boiled and non-boiled mastic leaves in lettuce germination, where in the first germination count of the non-boiled leaves, it was also the concentrations of 50 and 100% that affected the lettuce seeds. Due to the scarcity of studies involving tree species infused with mastic leaves, it was necessary to make the above comparisons.

Figure 1.

First germination count (%) of seeds of Leucaena leucocephala (Lam.) of Wit submitted to the infusion of mastic leaves.

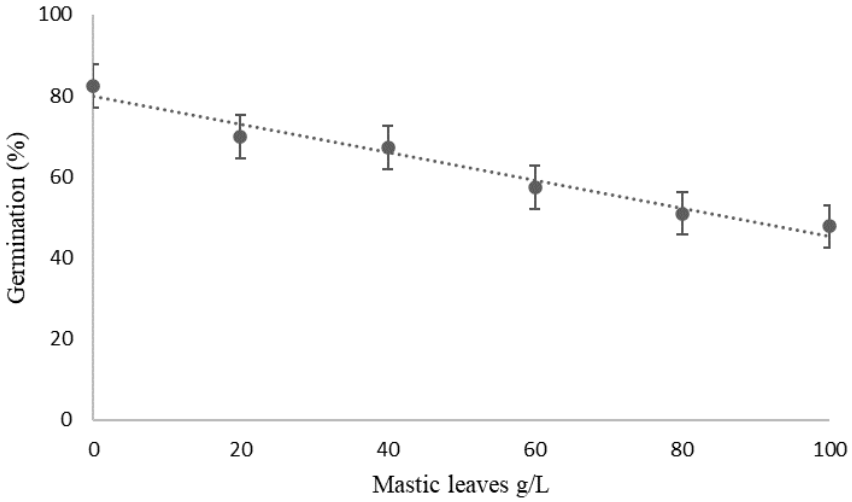


Note: Survey results, 2023.

During germination (Figure 2), there was a decreasing behavior with increasing concentrations. The results agree with Bitencourt et al. (2021), who found a low number of germinated seeds, specifically at the 100% concentration. In the same study, the phytochemistry and allelopathy of red mastic tree in the germination of *Eucalyptus camadulensis* seeds was analyzed, obtaining similar results when the seeds were exposed to high concentrations of the mastic tree.

Figure 2.

Germination (%) of seeds of Leucaena leucocephala (Lam.) of Wit submitted to the infusion of mastic leaves.

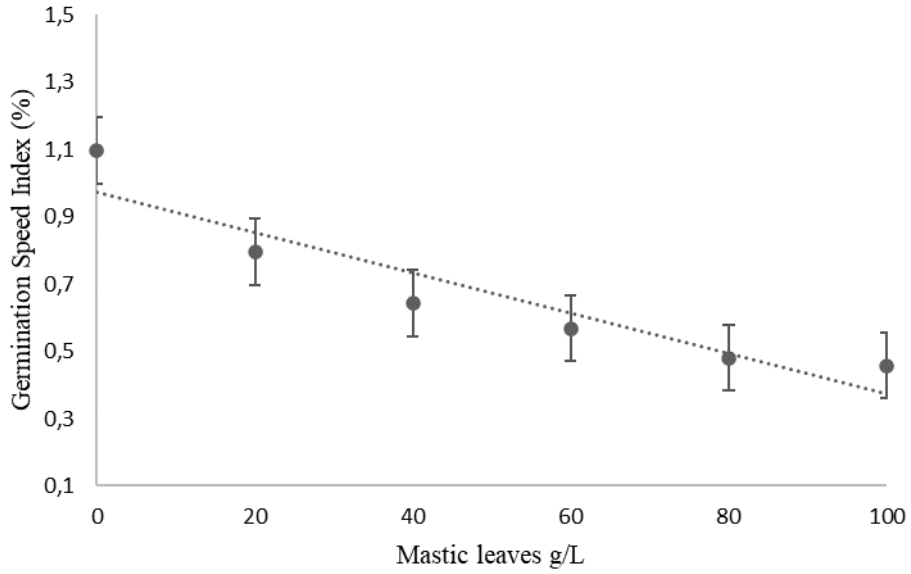


Note: Survey results, 2023.

There is also a reduction in the germination speed index with the increase of concentrations (Figure 3), these results agree with Souza et al. (2007) who when analyzing the aqueous extract of the mastic tree of 50 and 100% on lettuce (*Lactuta sativa*) seeds, they observed a decrease in the germination speed index. This can be explained by the results of germination, where the higher the concentration of the infusion of mastic leaves, the lower the germination.

Figure 3.

Germination speed index of seeds of Leucaena leucocephala (Lam.) of Wit submitted to the infusion of mastic leaves.



Note: Survey results, 2023.

Conclusion

The infusion of mastic leaves has an allelopathic effect on the physiological potential of *L. leucocephala* seeds at high concentrations.

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