

DORMANCY OVERCOMING OF *Schizolobium amazonicum* Huber ex Ducke. (CAESALPINOIDEAE) SEEDS

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ABSTRACT: Paricá is a large tree, reaching between 15 and 40 m in height and 50 to 100 cm in DBH (diameter at breast height), when measured at distance of 1.3 m from the ground. Most leguminous species, such as paricá, have exogenous integument-type dormancy. Therefore, the aim of this work was to evaluate the germination of *Schizolobium amazonicum* seeds collected in the northeastern region of the state of Pará. Treatments to overcome dormancy were: (T0) control (without treatment); (T1) - immersion in water at 100 °C during 10 m; (T2) manual scarification with # 40 sandpaper at the top of the seed, opposite to the embryo; and (T3) manual topping. For the germination of *S. amazonicum* seeds, tegument scarification with sandpaper showed to be the most effective pre-germinative treatment, with higher germination and normal seedlings percentage. This technique has low cost and is easy to be applied by nurserymen.

KEY WORDS: Paricá, germination, forest seeds

SUPERAÇÃO DE DORMÊNCIA EM SEMENTES DE *Schizolobium amazonicum* Huber ex Ducke. (CAESALPINOIDEAE)

RESUMO: Paricá é uma árvore de grande porte, podendo alcançar entre 15 a 40 m de altura e 50 a 100 cm de DAP (diâmetro altura do peito), quando medido a uma distância de 1.3 m do solo. A maioria das espécies leguminosas, como o paricá, possuem dormência exógena do tipo tegumentar. Sendo assim, o objetivo deste trabalho foi avaliar a germinação das sementes de *Schizolobium amazonicum* coletadas na região nordeste do Pará. Os tratamentos para superação de dormência utilizados foram: (T0) - testemunha (sem tratamento); (T1) - imersão em água quente a 100 °C durante 10 min, (T2) - escarificação com lixa nº 40 manualmente na parte superior da semente, oposta ao embrião e (T3) - desponte manual. Para a germinação de sementes de *S. amazonicum*, a escarificação do tegumento com lixa mostrou-se o tratamento pré-germinativo mais eficaz, com valores superiores no percentual de germinação e plântulas normais. Essa técnica apresenta baixo custo e é de fácil acesso e aplicação pelo viveirista.

PALAVRAS CHAVE: Paricá, germinação, sementes florestais.

INTRODUCTION

Schizolobium amazonicum Aubl., belongs to the Fabaceae botanical family, being a forest essence native to the Brazilian, Venezuelan, Colombian, Peruvian and Bolivian Amazonian forests. This species has morphological characteristics such as: deciduous tree with composite leaves, with 2-3 cm long leaflets, white wood, with fast and profitable growth (Carvalho, 2007).

The propagation of species is usually performed via seeds and due to their physical dormancy, they require prior treatment before sowing. For this, some practices are performed, such as scarification, topping

and immersion in hot water, methodologies indicated by the Seed Analysis Rule - RAS (Brasil, 2009).

Leguminous species, such as Paricá, have exogenous integument-type dormancy. This type of dormancy occurs due to the seed coat impermeability (shell), and the presence of a thick cuticular layer of wax that hinders water absorption, gas exchange and / or embryo expansion (Cardoso, 2004). In this context, studies should seek to facilitate uniformity and increase the germination rate of seeds and thus produce excellent quality seedlings (Shimizu et al., 2011).

Tegument-type physical dormancy is a defense mechanism of seeds, being seen as one of the main challenges for the production of paricá seedlings, making it necessary to carry out studies that identify the most effective dormancy overcoming techniques that are economically feasible to producers to increase seedling production of this species (Carvalho et al., 2019). Due to the constant search for efficient and low-cost techniques for overcoming dormancy of forest seeds, different methodologies were selected as promising for overcoming dormancy of Paricá seeds in order to select the most effective, among them Dapont et al. (2014), Leão et al. (2011), Shimizu et al., (2011) and Neto Silva et al. (2007). However, it is noteworthy that the application and efficiency of these methods depend on the dormancy degree, which varies among different specimens, origin and years of collection (Sperandio et al., 2013).

Thus, the aim of this work was to evaluate the germination of *S. amazonicum* seeds collected in the northeastern region of the state of Pará, after being submitted to different dormancy overcoming methods.

MATERIAL AND METHODS

S. amazonicum seeds were collected from a single matrix in the Pinoá indigenous reserve, municipality of Garrafão do Norte - PA, northeastern state of Pará in 2017.

The experiment was conducted at the Seed Laboratory of the Federal Rural University of Amazônia (UFRA), Campus of Capitão Poço - PA. The experimental design was completely randomized with three treatments and four replicates, each plot consisting of 25 seeds. Treatments were: (T0) - control (without any treatment), (T1) - immersion in hot water at 100 °C for 10 min, (T2) - manual scarification with # 40 sandpaper on the top of the seed, opposite to the embryo and (T3) - manual topping with scissors, removing a fragment from the top of the seed, opposite to the embryo. After treatments were applied, seeds were sown in germitest paper and placed in germination chamber for 14 days with 12-hour photoperiod at 25 ± 2 ° C.

Evaluations were performed at day 14, calculating: a) normal, abnormal seedlings, hard and dead seeds. Results were expressed as percentage (Brasil, 2009); b) first germination count: this evaluation was conducted in combination with the germination test, which consisted of the counting of normal seedlings

found at seven days after the beginning of the test, and results were expressed as percentage; c) seedling length: determined by measuring normal seedlings with the aid of a ruler graduated in millimeters; results being expressed in cm / seedling; d) Germination Speed (GS) - calculated according to Carvalho et al. (2005)

Data analysis was initially performed by checking normality with the Shapiro Wilk test. In cases where data did not present normal distribution, \sqrt{x} 0.5 transformation was applied, where x corresponds to the value to be transformed. Analysis of variance and Tukey test were applied at 5% significance level.

RESULTS AND DISCUSSION

During the experimental period, the importance of pre-germinative treatments in *S. amazonicum* seeds was evidenced in the first germination count (day 7), in which seeds without any treatment did not germinate. At the second count (day 14), in turn, germination percentage was 3%, a low level when compared to scarified seeds, which at day 14 had 95% germination. These data corroborate results obtained by Silva et al. (2011), with mechanical scarification in *Sesbania virgata* seeds, which also obtained 95% germination percentage. Neto Silva et al. (2007), in germination tests with *Schizolobium* seed also observed higher germination percentages after mechanical scarification.

Table 1 shows the average germination percentages, which show that scarification and topping treatments were the most effective in overcoming dormancy in *S. amazonicum* seeds, with average germination percentages of 95 and 91%, respectively. However, scarification had better results because it presented higher average percentage of normal seedlings (64%) and longer seedling length (15.36 cm) (Table 2). Their averages did not show significant differences ($p > 0.05$); however, the other treatments expressed significant differences, with average values of 3% and 32% for control and hot water, respectively. In the work of Dapont et al. (2014), immersion of *S. amazonicum* seeds in hot water at 100°C allowed 88% germination, lower than topping, with 98% of germinated seeds. Scarification and topping had beneficial effects on paricá seed germination speed for 14 days. The highest germination speed was observed in seeds submitted to topping, with 4.02 seeds.day⁻¹, followed by scarification, with germination speed of 2.45 seeds.day⁻¹, according to Table 1.

Table 1. First germination count (%), germination (%) and seed germination rate (seeds.day⁻¹) of *Schizolobium amazonicum* seeds submitted to pre-germination treatments.

Treatments	First germination count	Germination	Germination Speed
T1-Control	0.00 a*	3.00 a	0.05 a
T2- Hot Water	18.00ab	32.00 b	1.21 b
T3- Scarification	21.00 b	95.00 c	2.45 c
T4-Topping	67.00 c	91.00 c	4.02 d
CV (%)	36.59	13.58	20.83

* Means followed by the same letter do not differ from each other by the Tukey test at 5% probability.

Table 2. Percentage of normal seedlings (NS), abnormal seedlings (AS), hard seeds (HS), dead seeds (DS), and seedling length (SL).

Treatments	NS	AS	HS %	DS	SL (cm)
T1-Control	3.00 a*	0.00 a	93.00 c	4.00 a	2.78 a
T2- Hot Water	12.00 a	20.00 b	60.00 b	8.00 a	13.82 b
T3- Scarification	64.00 b	31.00 b	0.00 a	5.00 a	15.36 b
T4-Topping	24.00 a	67.00 c	0.00 a	9.00 a	12.08 b
CV (%)	43.65	26.98	22.34	82.37	30.55

* Means followed by the same letter do not differ from each other by the Tukey test at 5% probability.

Although topping was treatment with high germination percentage, it showed average of 67% of abnormal seedlings and 24% of normal seedlings. During counting, large amount of cotyledons attached to the seed coat was observed, which may be associated with abnormal seedling formation during the test.

The highest average percentage of normal seedlings was verified in the scarification treatment (64%), being also effective for all seeds to germinate. Treatment with hot water had the lowest average percentage of normal seedlings (12%) and did not show to be the most effective for germination, as it presented 60% of non-germinated seeds. For seedling length, treatment with higher values was scarification, with average length of 15.36 cm at day 14, followed by hot water (13.82 cm) and topping (12.08 cm).

Seeds with the lowest average germination percentage were non-scarified seeds (3%), with the same percentage of normal seedlings and percentage of 4% of dead seeds. In turn, topping treatment had 9% of dead seeds, followed by hot water and scarification, with 8 and 5%, respectively.

Dormancy becomes, therefore, a setback for seedling production, since seeds have no uniform development during germination and may represent loss of nursery productivity due to the time required for seed germination (Candido and Oliveira, 2018).

For the germination of *S. amazonicum* seeds, scarification of the seed coat with sandpaper proved to be the most effective pre-germination treatment, with higher values for germination percentage and normal seedlings. This technique has low cost and is easy to be applied by nurserymen.

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