

What is the Effect of Thiamine Hydrochloride on Rooting of Sapindaceae Stem Cuttings?

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ABSTRACT

Sapindaceae family presents notable richness of liana species in the Neotropics. Many of them are potentially ornamental, but still unexplored. Two Sapindaceae species were selected to test the efficiency of thiamine hydrochloride in plant propagation from stem cuttings. Thiamine hydrochloride has an unexplored potential for higher and better rooting of plant cuttings and it is a cheaper alternative to the traditional usage of phytohormones. Results showed no difference between treatment and control for all root variables evaluated in the two species studied. Seedling production from cuttings does not require application of thiamine hydrochloride in the concentration used to ensure rooting; only water irrigation is sufficient. However, further experiments involving different concentrations of thiamin hydrochloride should be conducted to detect whether different concentrations influence rooting.

Keywords: vitamin B1, vegetative propagation, seedling production.

Sapindaceae family presents notable richness of liana species in the Neotropics (Acevedo-Rodríguez et al., 2010). Many of them are potentially ornamental, but still unexplored. To exploit their ornamental features, it is necessary to use a type of seedling propagation that guarantees higher success. Vegetative propagation using stem cuttings provides some advantages in seedling production, e.g., standardization of a phenotype of interest and faster obtainment of seedlings, considering that it is not necessary to wait for the reproductive period to collect the seeds (Fachinello et al., 2005). To this end, two species of Sapindaceae were selected to test the efficiency of thiamine hydrochloride in plant propagation from stem cuttings under different treatments: *Paullinia meliifolia* Juss. and *Serjania cuspidata* Cambess. - both frequently found in the Atlantic Forest (Somner & Ferrucci, 2009). According to popular knowledge, the aqueous solution of thiamine hydrochloride (also known as vitamin B1) may contribute to higher and better rooting of plant cuttings; however, no scientific research has investigated this issue to date. Hence, we verified whether this substance could effectively contribute to seedling production. This study aimed to test the efficiency of thiamine hydrochloride in the rooting of two species of Sapindaceae with ornamental potential. If the effectiveness of thiamine hydrochloride is confirmed, it may be used as a cheaper alternative to the phytohormones (e.g., indole butyric acid - IBA [Atroch et al., 2000]) traditionally used in the rooting of cuttings.

We collected 60 and 50 semi-woody branches (cuttings) of *P. meliifolia* and *S. cuspidata*, respectively. The cuttings were 1-2 cm in diameter and 25-40 cm in length, with 3-4 buds. The cuttings were taken from both the apex and the middle portion of the branches. When examining the middle portion, the upper part of the cuttings was wrapped using small plastic bags to prevent loss of water through evapotranspiration. Half of the branches of each species were used in the treatment with thiamine hydrochloride ("B1" - aqueous solution of thiamin hydrochloride at 0.4 mg·mL⁻¹) and the other half were used in the control ("Control" - water only). The B1 and Control treatments were watered on alternate days. Each cutting was placed vertically in a plastic container so that two buds remained buried in the substrate and the others were exposed. The substrate used in the containers was an equal mixture of clay and sand. The experiment was conducted for 60 days. After that, the cuttings were carefully removed from the plastic containers to avoid damaging the roots and had the following variables measured for each species: length of main roots (LMR) and dry mass

of roots (DMR). Data were submitted to logarithmic transformation when the assumptions of normality and homogeneity of variances were not met. Then the B1 and Control treatments for each variable measured were compared using analysis of variance (ANOVA) ($\alpha \leq 0.05$). The Chi-squared test ($\alpha \leq 0.05$) was applied to detect possible differences in the frequency of rooting between *P. meliifolia* and *S. cuspidata*.

Results showed no difference between the B1 and Control treatments for all variables evaluated in the two species studied (Table 1). In addition, the result of the Chi-squared test showed no difference in the frequency of rooted cuttings between the species ($X^2=0.124$; DF=1; $p=0.724$).

The data indicated no effect of thiamine hydrochloride on the length of main roots and dry mass of roots in both species. This suggests that, considering the concentration of thiamine hydrochloride used, there was no increase in the length or dry mass of roots in the Sapindaceae species studied. Moreover, studies involving propagation of branch cuttings of Sapindaceae species using IBA (Atroch et al., 2000) also indicated a lack of influence of IBA on the same variables assessed in this study.

Thus, our results, corroborating those reported in literature (Rodrigues & Lucchesi, 1987; Carvalho et al., 2005; Atroch et al., 2000), reinforce that vegetative propagation in Sapindaceae can be obtained regardless of the use of growth regulators. This represents an economy in the seedling production of Sapindaceae species from branch cuttings. Furthermore, no difference was observed between the frequency of rooting cuttings and the species. This result indicates that phylogenetically related species respond similarly to the rooting of cuttings. Indeed, there is evidence that phylogenetically related species tend to respond

Table 1. Results of the ANOVA between the Control (water only) and B1 (aqueous solution of thiamin hydrochloride at 0.4 mg·mL⁻¹) treatments for the rooting of stem cuttings of *Paullinia meliifolia* and *Serjania cuspidata*. The variables analyzed for both species studied were length of main roots (LMR) and dry mass of roots (DMR).

Species	Variable	DF	F	P (≤ 0.05)*
<i>Paullinia meliifolia</i>	LMR	1	0.234	0.138
<i>Paullinia meliifolia</i>	DMR	1	0.781	0.385
<i>Serjania cuspidata</i>	LMR	1	0.004	0.948
<i>Serjania cuspidata</i>	DMR	1	0.426	0.524

DF = degrees of freedom; F = magnitude of the effect; *Significance level.

similarly to the rooting of cuttings even in other taxonomic groups (Fachinello et al., 2005).

Seedling production from cuttings in *Paullinia meliifolia* and *Serjania cuspidata* does not require application of vitamin B1 in the concentration used to ensure rooting; only water irrigation is sufficient. However, further experiments involving different concentrations of thiamin hydrochloride should be conducted to detect whether different concentrations influence rooting.

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