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EFFECTIVENESS OF METHODS TO INCREASE THE GERMINATION RATE OF *JURUBEBA* (*Solanum paniculatum* L.) SEEDS[1]

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RESUMO

EFICÁCIA DE MÉTODOS PARA INCREMENTAR A GERMINAÇÃO EM SEMENTES DE JURUBEBA (*Solanum paniculatum* L.)

Sementes de jurubeba (*Solanum paniculatum*) foram colhidas de bagas maduras de arbustos matrizes, cultivados em Goiânia (GO), em novembro de 2002. Destes frutos, foram separadas amostras de sementes puras, que foram submetidas aos seguintes tratamentos: lavagem das sementes em água corrente por cinco minutos; lavagem das sementes em água corrente por cinco minutos, mais imersão em solução de detergente (15 mL/100 mL H_2O) por cinco minutos, seguida de lavagem em água corrente por dois minutos; lavagem das sementes em água corrente por cinco minutos, imersão em solução de detergente (15 mL/100 mL H_2O) por cinco minutos, seguida de imersão em solução de hipoclorito de sódio (15 mL NaClO/100 mL H_2O) durante cinco minutos e de lavagem em água corrente por dois minutos; testemunha (sementes intactas). A seguir, as sementes foram submetidas ao teste de germinação, utilizando-se quatro repetições de 25 sementes por tratamento, em delineamento inteiramente casualizado. Concluiu-se que o emprego de detergente e hipoclorito de sódio aumenta a porcentagem de germinação das sementes, embora os tratamentos com estes produtos não diferiram ($p > 0.05$) da simples lavagem das sementes em água corrente.

PALAVRAS-CHAVE: Tecnologia de sementes; dormência.

ABSTRACT

Seeds from ripe *jurubeba* berries (*Solanum paniculatum*) were collected from mother shrubs at the Alternative Medicine Hospital, in Goiânia, Goiás State, Brazil, in November 2002. Samples of pure seeds were detached from the collected fruits and submitted to the following treatments: 1- washing under running water for five minutes; 2- washing under running water for five minutes, immersion in domestic detergent solution (15 mL/100 mL H_2O) for five minutes, and washing under running water for two minutes; 3- washing under running water for five minutes and immersion in domestic detergent solution (15 mL/100 mL H_2O) for five minutes, followed by immersion in sodium hypochlorite solution (15 mL NaClO/100 mL H_2O) for five minutes, and washing under running water for two minutes; 4- control (intact seeds). Four replications of 25 seeds per treatment were submitted to a germination test. A completely randomized design was used for statistical analysis. It was possible to conclude that the use of detergent and sodium hypochlorite increases the germination percentage in *jurubeba*, although it does not differ significantly ($p > 0,05$) from washing the seeds under running water.

KEY-WORDS: Seed technology; dormancy.

Jurubeba (*Solanum paniculatum* L.) is a variation of the *tupi* word *yuruwewa*, meaning "flat leave thorn" (Houaiss 2001). It is a native species from Brazil, where it occurs from north to south, growing also in other tropical parts of South America. *Jurubeba* belongs to the Solanaceae family, which is made up of more than 3,000 species and 90 genera, among herbaceous, shrubs, and a few trees. Economically, it is one of the most important families, including numerous ornamental, edible, spicy, medicinal, narcotic, and poisonous species (*Jurubeba* 1996). *Jurubeba* is frequently recognized as a weed, but its fruits are consumed as spice, in pickles, and additive, in sugar cane liquor, in several regions of Brazil (Lorenzi & Matos 2002).

It is a shrub that grows up to 3.0 m high, presenting a stalk with thorns. Its leaves are alternate, peciolated, entire, flat, dark-green on the upper-face

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and light-green on the under-face, with tiny prickles. Its flowers are violet or bluish panicles. Its fruits form spherical white-greenish berries, disposed in bunches, held to a long peduncle, containing numerous seeds (Panizza 1997). *Jurubeba* contains active compounds, studied in the 1960s by German researchers, which showed its medicinal importance. Mesia-Vela et al. (2002), analysing the effects of aqueous extracts of its roots, stems and flowers, found out that such extracts worked as gastric acid secretion inhibitors, in pylorus-ligated mice. The anti-ulcer activity was also related to a potent anti-secretory activity. These compounds are steroids, saponines, glycosides, and alkaloids. Liver curative properties are attributed to the soladine and solasodine alkaloids.

In the Farmacopéia Brasileira (Lorenzi & Matos 2002), it is described its specific use to treat anemia and liver diseases. *Jurubeba*'s roots, leaves, and fruits have a bitter taste and have been largely used by the traditional medicine, against digestive and hepatic dysfunction, and also to treat hepatitis, chronic gastritis, intermittent fevers, hydropsy, and uterine tumors. The leaf infusion is used to treat hangovers. For external use, it is prescribed as a healing agent for wounds, ulcers, itches, and lesions, when prepared as decoction, with chopped leaves. In the ayurvedic medicine, the whole plant has been indicated to treat bronchitis, throat pain, fever, and asthma (SUS 1992).

Jurubeba participates in the soil seed bank. It is persistent and colonizer, emerging immediately after forest alterations, such as deforestation and fire, acting efficiently to recover modified environments (Araújo et al. 2001). It is resistant and grows mainly in sandy soils, mostly infesting cropped areas, orchards and empty yards, and along roadsides (Lorenzi & Matos 2002).

The findings about mucilage in *jurubeba* seeds brought about the hypothesis on the presence of external seed inhibitors. According to Vieira (2006), seed dormancy is characterized by germination delay, even under favorable moisture, light, and oxygen conditions. It is a kind of adaptation that species present to deal with environmental conditions. Fowler & Bianchetti (2000) report that some species show integument or exogenous dormancy, with the presence of inhibitors. In some cases, the chemical inhibition effect is apparently more intense than the mechanical effect, requiring seed washing to suppress the dormancy. According to Carvalho & Nakagawa (2000), the deposition of suberine, lignin, cutin, tannins, pectin, and quinone derivatives cause seed cover impermeabilization.

Several researchers describe experiments about seed dormancy suppression. Garcia et al. (2000) studied methods for black pepper (*Piper nigrum* L.) seed dormancy, considering that germination delay could be attributed to an inhibitor in the enveloping mucilage. Five treatments were compared: seeds with coats; seeds without coats; seeds washed in running water; seeds without coats, immersed in a 50% detergent solution; and seeds without coats, immersed in sodium hypochlorite 20%, and washed in running water for five minutes. The authors verified that immersion of seeds without coats in a 50% detergent solution was the most effective method to remove this mucilage and increase the speed and percentage of seed germination. Pinheiro et al. (2001) used running water and sodium hypochlorite to remove germination inhibitors, in *in vitro* seed germination tests for *mangaba* (*Hancornia speciosa* Gomez).

Melo & Gonçalves (2001) evaluated the presence of germination inhibitors in *pequi* (*Caryocar brasiliense* L.) seeds and parts of the fruit. Extracts were removed and tested in lettuce (*Lactuca sativa* L.) seed germination. The conclusion was that the germination inhibitors are present in seeds and absent in other parts of the fruit. According to a similar method, Pereira et al. (2001) investigated the effect of inhibitors in coffee seeds, concluding that the spermoderm may contribute to the slow coffee seed germination, probably due to the presence of caffeine. Franco & Ferreira (2002) applied six *in vitro* pre-germinative treatments of *morototó* (*Didimopanx morototoni* (Aub.) Dene et Planch) seeds, including washing them with water for 15, 30, and 45 minutes, and with water and alcohol (1:1) for 15, 30, and 45 minutes. They concluded that the species presents partial dormancy, due to the tegument hardness, and presence of inhibiting substances in the seed tegument, possibly phenols.

Considering that, the objective of this research was to define a method to increase the *jurubeba* seeds germination rate, as possibly related to inhibitors present in the mucilage involving its seeds. According to Popinigis (1977) and Cícero (1986), the mucilage present on seeds may carry germination inhibitors.

The research was developed in the "Escola de Agronomia e Engenharia de Alimentos" Seed

Laboratory, Federal University of Goiás. Ripe fruits were harvested in the Alternative Medicine Hospital nursery, in Goiânia, Goiás, Brazil, on May 2, 2002. Seeds were extracted manually and treated as it follows: T1- washing under running water (5'); T2- washing under running water (5') and immersion in domestic detergent solution (15 mL/100 mL H_2O - 5'), followed by washing under running water (2'); T3- washing under running water (5'), immersion in domestic detergent solution (15 mL/100 mL H_2O - 5'), and immersion in sodium hypochlorite solution (15 mL NaClO/100 mL H_2O - 5'), followed by washing under running water (2'); and T4- control (intact seeds).

After the treatments, four replications of 25 pure seeds were sowed in Gerbox, on germitest paper, brought to the germinator at 20ºC and counted for four weeks. Germination data were analyzed as a completely randomized design by variance analysis, and the mean treatments were compared by using the Tukey test, at 5% of significance level probability. Table 1 presents the results of this statistical test, showing that treatments T1, T2, and T3 did not differ significantly, but that all of them were different from the control, promoting a germination rate increase. The treatment based on washing the seeds under running water for five minutes (T1) promoted a 20% germination rate increment, corresponding to 45.5%, as compared to the control, while the immersion in domestic detergent solution for five minutes, plus washing them under running water for two minutes (T2), increased germination by 21.6%, as related to the control. Seeds treated with washing under running water for five minutes, plus immersion in domestic detergent solution, also for five minutes, followed by the immersion in a sodium hypochlorite solution for five minutes, and washing under running water for two minutes (T3), increased germination by 29.0%, as related to the control. This effect probably resulted from a higher accuracy in the mucilage removal for these treatments. Similar results were found by Garcia et al. (2000), working with dormancy removal in *Piper nigrum* seeds, and Popinigis (1977) and Cícero (1986) report the association between the mucilage presence on seeds and germination inhibitors.

The analysis of the data allowed us to conclude that, under the conditions of this experiment, the association of detergent and hypochlorite increases the germination percentage in *jurubeba* (*S. paniculatum*), although the seed treatments with these products, for five minutes each, did not differ significantly ($p > 0,05$) from washing the seeds under running water, also for five minutes.

Table 1. *Jurubeba* (*Solanum paniculatum* L.) seeds mean germination (%), submitted to removal of germination inhibitors treatments.

Treatments		Mean germination (%)
T1	Washing under running water (5')	64.0 a[1]
T2	Washing under running water (5') and immersion in domestic detergent solution (15 mL/100 mL H_2O - 5'), followed by washing under running water (2')	65.6 a
T3	Washing under running water (5'), immersion in domestic detergent solution (15 mL/100 mL H_2O - 5'), and immersion in sodium hypochlorite solution (15 mL NaClO/100 mL H_2O - 5'), followed by washing under running water (2')	73.0 a
T4	Control (intact seeds)	44.0 b

[1]- Mean germination rates followed by the same letter did not differ significantly by the Tukey test, at 5% probability.

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