METHODS OF SEED EXTRACTION BY TAMARIND (*Tamarindus indica*)

ABSTRACT

Tamarind has a good nutritional composition, presenting good values of proteins, carbohydrates, dietary fibers, calcium, and low lipid and cholesterol content. The germination pattern of tamarind seeds is like that of other legume species, in which the hard integument interferes in the absorption of water and oxygen thus limiting germination. Therefore, this study aimed to evaluate the viability and vigor of tamarind seeds submitted to different extraction methods. The extraction methods for seed removal were washing in running water with the aid of a knife, washing in running water with the aid of a sieve, blender, fermentation for 48h with 66.6% water + 33.3% sugar, fermentation for 48h with 50% water + 50% sugar and fermentation only with water for 72h. The extraction methods for seed removal: fermentation for 48h (50% water + 50% sugar) and fermentation in water for 72 hours, provided greater viability and vigor in Tamarind seeds.

Keywords: germination, fruit, development, and vigor extraction methods.

Introduction

The Tamarind (*Tamarindus indica L.*) is a fruit plant that belongs to the Legume family, native to Equatorial Africa, India, and Southeast Asia. It is considered an ideal tree for semiarid regions, tolerating 5 to 6 months of drought conditions, but does not survive at low temperatures [1]. In Brazil, it is widespread in tropical and subtropical regions, appreciated for the refreshing, acidic, and astringent flavor of the fruit used in the manufacture of candies, soft drinks, liqueurs, and ice cream and for the beauty and production of shade, being used in ornamentation, afforestation, and urbanization. Its industrialization has been largely in the form of juices and pastes prepared from the pulp [2]. *

Its fruit is an elongated pod, 5 to 15 cm long, with dark brown, woody, and brittle bark, containing 3 to 8 seeds surrounded by a brown and acidic pulp [3].

According to Reis (2013) [4], tamarind has a good nutritional composition, presenting good values of protein, carbohydrate, dietary fiber, calcium, and low lipid and cholesterol contents. According to the Brazilian

~~Table of Food Composition (Taco), for every 100 g of raw tamarind, approximately 300 kcal, 3 g of protein, 0.5 g of lipids, 70 g of carbohydrate, and 6 g of dietary fiber were found: 40 mg calcium, 0 mg cholesterol and significant amounts of iron, phosphorus, zinc, vitamin B1, vitamin B2 and vitamin C [5].~~ Not relevant to the study

The germination pattern of tamarind seeds is like that of other legume species, in which the hard integument interferes in the absorption of water and oxygen thus limiting germination. Few studies address aspects related to the spread of tamarind, mentioning that it occurs by seed and vegetatively, by grafting, stout, and air layering., with a predominance of the sexual route [6].

Its exploitation has been predominantly extractive, being carried out by small farmers, ensuring employment in the informal market. To minimize this type of problem, research is necessary to obtain more information about the culture, for a better rational industrial use. The exploitation of a plant species depends on technical knowledge, fundamental for the definition of rational exploration technologies, including seedling production [1]. According to Cáceres (2003) [7], there are currently few studies that treat tamarind as fruit and on its processing, especially about pulp extracted from tamarind.

Therefore, this study aimed to evaluate the viability and vigor of tamarind seeds submitted to different extraction methods.

Material and Methods

The experiment was conducted in a greenhouse at the Federal Institute of Education, Science, and Technology of Tocantins - Gurupi Campus from August 8 to November 26, 2020. Averege temprature and rh may be indicated Healthy and ripe tamarind fruits (*Tamarindus indica* L.) were collected in the urban region of Gurupi in September 2020 and seeds removed directly from the fruits were used.

The extraction methods for seed removal were washing in running water with the aid of a knife, washing in running water with the aid of a sieve, blender, fermentation for 48h with 66.6% water + 33.3% sugar, fermentation for 48h with 50% water + 50% sugar and fermentation only with water for 72h. It is noteworthy that, at the end of each method, both were washed in running water to remove possible remnants of the pulp in the seed.

The substrate used for sowing tamarind seeds after the treatments for seed extraction was washed sand. In each plastic tray capacity may be included, 100 seeds were used per treatment, divided into four replicates of 25 seeds each. Two irrigations were performed daily, and the experiment was monitored after seedling emergence, the evaluation and data collection process began.

The following characteristics were evaluated: Root length (RL) and shoot (SL): seedlings were removed from the trays and with the aid of a ruler graduated in centimeters, measured from the apical yolk to the end of the apical root, and measured from the neck to the apex of the seedling. The results were expressed in cm, according to Nakagawa recommendations (1994) [8]; Number of leaves (NL): after seedling removal, the number of leaves was counted. The results were expressed as a unit. First emergency count (FEC): the first emergency count was performed 20 days after sowing. The data collected were corresponding to the accumulated percentage of normal seedlings, with values recorded for each method. Seedling emergence (SE): 100 seeds were used, distributed in four replicates of 25 seeds. The count of the number of germinated seeds started 6 days after sowing and extended to emergence stabilization in all methods. The criterion used was that of normal seedlings that presented the perfect essential structures [9], and the results were expressed in percentage. The interpretation of the data was descriptive.

Results and Discussion

In general, the evaluated characteristics showed sensitivity by indicating differences in the treatments applied for extraction of Tamarind seeds (Table 1), where the highest values of root and shoot length were obtained in fermentation 48 hours with 50% water + 50% sugar (13.1 and 18.5 cm), fermentation only with water for 72 hours (12.2 and 17.8 cm) and slightly lower values in fermentation treatment for 48 hours with 66.6% of water + 33.3% of sugar (11.8 and 17.3 cm). According to Gomes et al., 2002 [10], the importance of the variable shoot height enables its use to estimate the morphological quality of seedlings as a function that their measurement is easy and has a good contribution to determining the quality standard.

Table 1. Root length (cm), shoot length (cm), number of leaves (un), first emergency count (%), and seedling emergence (%) of Tamarind seeds, submitted to different extraction methods

Treatment	RL	SL	NL	FEC	SE
Washing running water with a knife aid	10,9	16,8	4	64	78
Washing running water with the aid of a sieve	10,1	16.4	4	70	76
Blender	11,4	17,1	4	71	79
Fermentation 48h (66.6% water + 33.3% sugar)	11,8	17,3	7	75	85
Fermentation 48h (50.0% water + 50.0% sugar)	13,1	18,5	7	85	96
Fermentation with water for 72h	12,2	17,8	7	80	90

Regarding the number of leaves even with small variations (4 and 7un), the same treatments stood out fermentation for 48 hours with 50% water + 50% sugar, fermentation only with water for 72 hours, and fermentation for 48 hours with 66.6% water + 33.3% sugar (7 units) respectively.

Data regarding the first count of seedling emergence and emergence, as a function of the different seed extraction methods, can be found in Table 1. Once again, the treatments stood out: fermentation for 48 hours with 50% water + 50% sugar (85 and 96%), fermentation only with water for 72 hours (80 and 90%), and fermentation for 48 hours with 66.6% water + 33.3% sugar (75 and 85%). According to Pereira et al. (2007), healthy tamarind seeds have approximately 72% germination and can be increased with simple seed treatments such as: soaking the seeds in clean water for 24 hours (can raise germination by 80%). A lower value was presented by the washing treatment in running water with the aid of a sieve (70 and 76%), probably the friction of the sieve and the seed caused damage to essential structures, causing lower values of viability and vigor. Statistical analysis to be peroformed. More disussion should be added recent remerence must be cited

Conclusion

The extraction methods for seed removal: fermentation for 48h (50% water + 50% sugar) and fermentation in water for 72 hours, provided greater viability and vigor in Tamarind seeds.

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