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Viability and Vigor of White Guava *(Psidium guajava* L.) Seeds in Different Stages of Maturation

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Authors' contributions

This work was performed in collaboration with all authors. Authors DIB and HVN designed the study and performed the statistical analysis. Authors NAS and MSQ wrote the protocol and wrote the first draft of the manuscript. Authors LBO and PBV managed the study analyzes. Finally, authors RAL, PVGS, EAR, and BHNN managed the bibliographic searches. All authors read and approved the final manuscript.

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ABSTRACT

The white Guava (*Psidium guajava* L.*)* is a native fruit tree belonging to the family Myrtaceae, which has a lot of rusticity, adapting to various edaphoclimatic conditions. White Guava is a fruit native to tropical America and the most cultivated species of the Myrtaceae family. It is an excellent source of vitamin C and has an appreciable amount of minerals such as calcium, phosphorus, and iron. The objective of this work was to determine the viability and vigor of white guava seeds at different stages of fruit maturation. The experiment was carried out in the greenhouse of the Federal Institute of Education (IFTO), Science and Technology of Tocantins, in the city of Gurupi – Tocantins - Brazil, between February 17 and July 28, 2020. The white guava seeds collected directly from the fruit were used, which were harvested in the urban region of Gurupi – Tocantins - Brazil in February 2020. Root and shoot length, number of leaves, first emergency count, and seedling emergence were evaluated. White Guava seeds, taken from ripe fruits, provided the highest viability and vigor values.

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1. INTRODUCTION

Guava (*Psidium guajava* L.) is a native fruit tree belonging to the Myrtaceae family, which has a lot of rusticity, adapting to various edaphoclimatic conditions [1]. The most cultivated species of this family are native to tropical America, and it is grown in Brazil from the Rio Grande do Sul to Maranhão, with the state of São Paulo being the country's greatest producer. [2]. It is an excellent source of vitamin C and has many minerals such as calcium, phosphorus, and iron [3]. In general, fruits are consumed in natura or the form of juices, liqueurs, ice creams, jellies, and assorted sweets [4]. It is considered a small to medium-sized shrub, its leaves are opposite, elliptical, oblong, and green, the flowers are white, hermaphrodite, and fragrant and fruit production can begin from one year [5]. The fruit of guava has a globose berry shape of variable peel and pulp colors and internally the mesocarp of firm texture, pasty consistency, and numerous seeds [6].

Its propagation can be performed by sexual means, through seeds, or asexual, by vegetative parts [7]. Despite the preferences for use of the asexual method, it is still possible to use seeds to obtain rootstock and for use by breeding programs, being in this case adopted for progenies tests that may after selection constitute a new selection [8]. In Brazil, the use of seeds is justified by the ease of seedling production and in the rootstock process, genetic improvement, and the maintenance of genetic variability [9].

The use of high quality seeds is an essential factor in the implantation and success of a crop. The phase of maximum seed quality coincides with the physiological maturation point, which is reached when the seed has maximum dry mass content, marked reduction in water content, visible changes in the external aspect of fruits and seeds, culminating in maximum germination capacity and vigor of the same [10,11].

There are many recommendations on the state of maturation in the choice of fruits, for the removal of seeds used in the propagation process. The observation of the maturation stage is of importance in the conservation of the germination influence of seeds, and factors such as the nature of the seeds and environmental conditions affect their germination [12-14]. In the case of white guava seeds, [15] recommends that the harvest should be carried out when the fruits reach the state of maturation because the seeds are physiologically ripe before the complete maturation of fruits.

Despite the progress of research in seed technology in Brazil, there is still much to be explored about fruit species, because the lack of basic technical knowledge limits the practice of seed analysis, making it difficult to obtain information that expresses physical and physiological quality [16].

Therefore, the objective of this work was to determine the viability and vigor of white guava seeds at different stages of fruit maturation.

2. MATERIALS AND METHODS

The experiment was carried out in the greenhouse of the Federal Institute of Education (IFTO), Science and Technology of Tocantins in the city of Gurupi – Tocantins - Brazil, between February 17 and July 28, 2020. The seeds of white guava (*Psidium guajava* L.*)* were taken directly from the fruits, which were harvested in the urban region of Gurupi-TO in February 2020.

The treatments applied to the seeds consisted of the different stages of fruit maturation, which were classified as: green fruits (collected from the plant with dark green bark coloration), fruits "half mature" (collected from the plant with light green peel coloration), and ripe fruits (collected from the plant with yellowish coloration). For pulping, the seeds were washed in a sieve with running water, to facilitate the separation process of the seed from the rest of the adhered pulp. After that, they were scattered on paper towels and remained in the shade for 12 hours.

In the experiment, the commercial substrate was used, divided into 3 plastic trays, one for each treatment. Being used 100 seeds for each treatment, divided into 4 replications with 25 seeds each. All trays with the substrate already sold were submitted to two irrigations per day throughout the seedling formation period.

From the installation of the experiment, the procedure of data collection and evaluation was initiated. The following characteristics were evaluated:

Root (RL) and shoot length (SL): seedlings were removed from the trays and with the assistance of a ruler graduated in centimeters, measured from the apical yolk to the end of the root and apical yolk to the apex of the seedling, respectively. The results were expressed in centimeters, according to [17].

Number of Leaves (NL): after the removal of seedlings, the number of leaves of each seedling was counted. The results were expressed as a unit.

First Emergency Count (FEC): the first emergency count was performed 16 days after sowing.

Seedling Emergence (SE): The count of the number of germinated seeds started 13 days after sowing and extended to emergence stabilization in all substrates. The results were expressed as a percentage and the criterion used was seedlings that presented the perfect essential structures [18].

The results obtained were submitted to variance analysis and the comparison of the means was made by the Tukey test, at 5% probability. The data were submitted to variance analysis and the means were compared by the Tukey test, using the statistical program Sisvar®.

3. RESULTS AND DISCUSSION

In general, the evaluated characteristics showed sensitivity by indicating differences in the maturation stages of white guava fruits (Table 1), where the highest values of root length were obtained when the seeds were removed from the ripe harvested fruits and "half mature" (18.2 cm; 17.7 cm) and lower in the green stage (10.4 cm), respectively. It was an even higher value of shoot length when the seeds were removed from the ripe and "half mature" harvested fruits (5.2 cm; 4.5 cm) and lower in the green stage (3.5 cm), respectively. [19] stated that the variable shoot length makes it possible to estimate the morphological quality of seedlings as a function of its measurement being easy and present in good contribution in the determination of quality. Probably, the seeds taken from ripe fruits and "half mature" had already reached physiological maturity, where all morphological and functional changes that occur from the fertilization of the egg to reach the moment of harvest, presenting transformations in the size and content of dry matter. The determination of the physiological maturity of fruits is important to guide the ideal harvest season, as it helps the planning of this operation in processing, drying, storage, and quality control [20].

Averages followed by the same letter in the column, for each experiment, do not differ from each other by the Tukey test at 5%.

Regarding the number of leaves, even with small variation (5un; 7 un), the same trend was observed, highlighting the seeds taken from the fruits harvested ripely and "half mature" (7 un; 6 un) and lower in the green stage (4 un), respectively.

Data regarding the first count of emergence and emergence of seedlings, as a function of the maturation stages of white guava fruits, are found in Table 1. Once again, the seeds taken from the harvested fruits mature (67% and 94%) and lower for the seeds taken from the green harvested fruits (25 and 50%), respectively, stood out. Similar responses were found by [21], where the use of seeds of fruits harvested at a pre-mature and mature maturation stage presented higher physiological quality. Seed germination is a complex process that involves many reactions and phases and each of them is affected by temperature, such as seed flowering and maturation [13].

Table 1. Root length (cm), shoot length (cm), number of leaves (un), first emergency count (%), and seedling emergence (%) of White Guava, submitted to different maturation stages, IFTO - TO, 2021

Maturation Stages	RL	SL	NL	FEC	SE
Green fruits	10.4 b	3.5 b	4 b	25 c	50 c
Half mature fruits	17.7ab	4.5ab	6a	49 b	79 b
Ripe fruits	18.2a	5.2a	7a	67a	94ª
CV (%)	8.1	1.9	3	16	19

CV- Coefficient of variation

4. CONCLUSION

White Guava seeds, taken from ripe fruits, provided the highest viability and vigor values.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Cavalcante LF, Vieira MS, Santos AF, Oliveira WM, Nascimento JAM. Saline water and liquid bovine manure in the formation of guava seedlings cultivar paluma. Brazilian Journal of Fruit Culture, Jaboticabal-SP. 2010;32(1):251-261.
2. Pereira FM. Guava culture. Jaboticabal: Funep. 1995;47.
3. Ali ZM, Lazan H. Postharvest physiology and storage of tropical and subtropical fruits. Nadia, West Bengal, India. 2001;2:145-165.
4. Almeida SP. Cerrado: food use. Planaltine: Embrapa - CPAC. 1998;188.
5. Gonzaga neto L, Soares JM. The guava culture. Red Fruit Series. Plant Collection, 27.1. Ed. Brasília: Embrapa Information Production; Petrolina, PE: Embrapa Semi-Arid. 1995;75.
6. Ferreira MGR, Ribeiro GD. Collection of tropical fruit trees from Embrapa Rondônia. Technical Announcement 106. Old Port-RO; 2006.
7. Manica I, Icuma IM, Salvador JO, Moreira A, Malavolta E. Tropical fruit growing guava. Porto Alegre, Five continents. 2001;6:334.
8. Hossel C, Hossel JSAL, Wagner Júnior A, Dallago A. Physiological quality of white guava seeds according to extraction and storage. Brazilian Journal of Applied Technology for Agricultural Science, Guarapuava-PR. 2006;9(3):61-68.
9. Danner MA, Citadin I, Fernandes Junior AA, Assmann AP, Mazaro SM, Sasso SAZ. Formation of Jabuticabeira (*Plinia* sp.) seedlings in different substrates and container sizes. Brazilian Journal of Fruit Culture. Jaboticabal. 2007;29(1):179-182.
10. Popinigis, F. Seed physiology. Brasilia: Agiplan. 1985:289.
11. Carvalho NM, Nakagawa J. Seeds: Science, technology and production. 4. ed. Jaboticabal: Funep. 2000;588.
12. Simão, S. Fruit Trade Treaty. Piracicaba: FEALQ. 1998;760.
13. Lopes JC, Pereira MD. Germination of seeds in different substrates and temperatures. Brazilian Seed Magazine. 2005;27(2):146-150.
14. Lopes JC, Silva CA, Overira FM, Macedo CMP, Matheus MT. Influence of maturation stages on germination and vigor of okra seeds. In: Brazilian congress of Olericulture. 2006;24:2549-2552.
15. Bruckner AH, Pereira FM, Nachtigal JC. Breeding of tropical fruit trees. In: Goiabeira. Viçosa: UFV. 2002;267-289.
16. Silva KMP, Silva RM, Garcia KGV, Sampaio PRF, Aguiar AVM, Cardoso EA. Emergence and growth of guava seedlings under different substrates and sowing depth. Scientific Agriculture in the Semi-Arid. 2013;9(2):01-06.
17. Nakagawa, J. Vigor tests based on the seedling evaluation. In: Vieira RD, Carvalho NM. Seed vigor tests. Jaboticabal: FUNEP. 1994;7:49-85.
18. Brazil. Ministry of Agriculture and Agrarian Reform. Rules for seed analysis. Brasilia: CLAV/DNDV/MA; 1992.
19. Gomes JM, Couto L, Milk HG, Xavier A, Garcia SLR. Morphological parameters in the evaluation of the quality of *Eucalyptus grandis* seedlings. Tree Magazine. 2002;26(6):655-664.
20. Bittencourt JFN, Seder R, Ungaro MRG, Toledo NMP. Physiological maturation of sunflower seeds cv. contisol. Brazilian Seed Magazine. 1991;13(2):81-85.
21. Freitas AR, Matheus MT, Lopes JC. Germination of guava seeds (*Psidium guajava* l. var. paluma) in different maturation stages; 2007.
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