Original Research Article

QUALITY OF GUAVA SEED (*PSIDIUM GUAJAVA* L.) WHITE AND RED VARIETIES ON DIFFERENT SUBSTRATES

Abstract*—Guava tree is the fruit of the guava tree of the species Psidium guajava L. belonging to the family of Myrtaceae a rustic fruit and adapts to the most varied types of soils. It is a fleshy fruit, thin-skinned, green, or when mature yellowish and very rich in soluble fibers. Seed germination is influenced by factors such as substrate, which can improve germination, resulting in the acquisition of more vigorous seedlings. The experiment was conducted in a greenhouse at the Federal Institute of Education, Science and Technology of Tocantins, Gurupi/TO, in 2017. The seeds of guava Kumagai and Paluma (Psidium Guajava L.) used in the experiment were taken directly from the fruit, which was collected in the urban region of Gurupi in March 2017. For the two varieties evaluated, both for the first emergence count and seedling emergence, the substrates stood out: organic compound + black earth + commercial substrate (55 % and 37 %) (67% and 49%), washed sand + rice straw + black earth (52% and 36 %) (52% and 36 %) lower substrates: washed sand (46% and 10 %) (66% and 35 %) and rice straw + sawdust + black ground (47% and 7 %) (59% and 31 %), respectively. The substrates: organic compound + black earth + commercial substrate and washed sand + rice straw + black earth provided the highest values of viability and vigour in white and red pulp guava seeds.*

Keywords—Quality, guava seedlings varieties, substrates

1. Introduction

Present in most states in the Midwest, North and Northeast regions, the Cerrado occupies 24% of Brazilian territory with an area of about 2,036,448 km2 being the second largest biome in Brazil [1]. The Cerrado flora has numerous fruit species with great potential for agricultural use, which are typically used by the local population. In general, fruits are consumed in nature or the form of juices, liqueurs, ice creams, jams and varied sweets [2] [3].

Psidium guajava L. has attracted the attention of researchers to create new products in the area of pharmacology because they have, flavonoids, essential oils, sesquiterpenoid alkalis, and triterpenoid acids. In India and China, leaves are used as antitussive and anti-inflammatory and parts of the plant such as bark, shoots, leaves and roots can also be used for the treatment of cramps, colitis, diarrhea, and bellyaches [4] [5].

The Guava is the fruit produced by Psidium guajava L. belonging to the Family of Myrtaceae, which is a rustic fruit and adapts to the most varied types of soils. It is a fleshy fruit, of green bark or, when ripe, yellowish. It is originally from tropical America, popularly found throughout Brazil. The fruit pulp is delicately sweet and aromatic and can be white, red, yellow or pink and has different sizes.

There are two varieties of this species: the pomifera variety, in which the fruit is rounded and the reddish mesocarp; and the pyrifera variety, where the fruit is pyriform with white inside, being called white guava or China [6]. Simultaneously in the same study, the author states that when ripe the fruit is mucilaginous and when astringent green. According to [7], there is in the red guava a fundamental element to nutritional properties: lycopene, a carotenoid pigment that is responsible for the reddish color of the pulp. Thus, it is evident that the more reddish the fruit pulp, the higher the lycopene content. There are now some varieties of guava, such as Kumagai and Paluma, related to a white and red varieties pulp, respectively.

Its spread may be sexual, through seeds, or asexual, by vegetative parts [8]. In Brazil, seed use is justified by the ease of

seedling production and in the process of rooting grafts, genetic improvement and maintenance of genetic variability [9]. Seed germination is influenced by factors such as the substrate, which can be improved to improve germination, resulting in the getting of more vigorous seedlings production. The substrate has the function of supplying moisture seeds and providing adequate conditions for germination and subsequent seedling development and should maintain an adequate proportion between water availability and aeration and, thus, avoid information of an aqueous film on the seed, which prevents oxygen penetration and contributes to the proliferation of pathogens [10]. When choosing a substrate, some aspects should be considered as seed size, requirement regarding humidity and light, ease that it offers during installation, the realization of counts and evaluation of seedlings [11].

Therefore, the objective of this work was to determine, regarding the different substrates, the quality of guava seeds of the white and red varieties.

2. Materials and methods

The experiment was conducted in a greenhouse at the Federal Institute of Education, Science, and Technology of Tocantins, Gurupi/TO city, from March 26 to July 1, 2017. Seeds of the Guava Kumagai and Paluma (*Psidium Guajava* L.) were used to experiment directly from the fruit, which was collected in the urban region of Gurupi. The harvested fruits were submitted to pulping for seed removal (with the abundant presence of mucilage). The seeds were removed from healthy and ripe fruits, washed in running water and macerated in the sieve to facilitate the separation of the seed from the pulp. Afterward, they were scattered on paper towels and remained in the shade for 12 hours.

The experiment was conducted in a factorial scheme (2x4), arranged in a completely randomized design, two of which were the different cultivars (red guava and white guava) four types of substrates being: Washed sand (WS); Rice straw + sawdust + black ground (RSB); Organic compound + black earth + commercial substrate (OBC) and washed sand + rice straw + black earth (WRB).

A total of 100 seeds per treatment (substrate) were used, divided into 4 replicates with 25 seeds each. Sowing was carried out in a greenhouse of the IFTO campuses. All trays with the substrates already sown were submitted to two daily irrigation in the first 30 days and then 1 time a day in the remainder of the seedling formation period.

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

- **Root length (RL) and shoot length (SL)**: seedlings were removed from trays and with the aid of a ruler graduated in centimeters, measured from apical yolk to the end of the root and apical yolk to the apex of the seedling, respectively.
- **The number of leaves (NL)**: after withdrawal, the number of leaves of each seedling was counted.
- **First emergency count (FEC)**: the first emergency count was performed 21 days after sowing.
- **Seedling emergence (SE)**: The count of the number of germinated seeds started 21 days after sowing and extended until seedling stabilization concerning maximum visual length, which presented the perfect essential conditions [9].

3. Results and Discussion

In general, the characteristics evaluated showed sensitivity when indicating differences in substrate quality, where the highest values, for the two varieties evaluated, of root length, were obtained when the seeds were sown in the Substrates: OBC (15.8 cm and 16.0 cm), WRB (15.2 cm and 14.8 cm) and lower substrates: WS (14.5 cm and 11.9 cm) and RSB (14.4 cm and 12.5 cm), respectively.

[11] working with pine cone rootstock also found that the commercial substrate was the one that provided better root development due to its higher fertility. It was also observed that the highest values, for both varieties evaluated, of shoot length, were obtained in the substrates: OBC (10.4 cm and 10.7 cm), WRB (8.9 cm and 8.7 cm) and lower substrates: WS (4.7 cm and4.5 cm) and RSB (1.7 cm and 3.2 cm), respectively.

[12] also cite that substrates rich in phosphorus, calcium, and potassium, can be part of the composition of substrates for

seedlings production. The number of leaves showed large variation (4.7 un and 10.5 un), for both varieties evaluated, where the substrates: OBC (8.5 un and 10.5 un) and WRB (8.0 un and 9.8 un) stood out, respectively. Data on the first emergency and emergence count of seedlings, as a function of the different substrates, are shown in Table 1.

Table 1: Root length (cm), shoot length (cm), number of leaves (un), first emergence count (%) and seedling emergence (%) of guava seeds of white and red pulp on different substrates.

Treatments	**RL (cm)**	**SL (cm)**	**NL (cm)**	**FEC (%)**	**SE (%)**
White Variety					
Washed sand (WS)	14,5b	4,7b	5,8b	46,0b	66,0a
Rice straw + sawdust + black ground (RSB)	14,4b	1,7c	4,7b	47,0b	59,0b
Compound organic + black earth + substrate commercial (OBC)	15,8a	10,4a	8,5a	55,0a	67,0a
Washed sand + rice straw + black earth (WRB)	15,2a	8,9a	8,0a	52,0a	67,0a
Red Variety					
Washed sand (WS)	11,9b	4,5c	7,5b	10,0b	35,0b
Rice straw + sawdust + black ground (RSB)	12,5b	3,2c	6,1b	7,0b	31,0b
Compound organic + black earth + substrate commercial (OBC)	16,0a	10,7a	10,5a	37,0a	49,0a
Washed sand + rice straw + black earth (WRB)	14,8a	8,7b	9,8a	36,0a	46,0
CV (%)	4,5	9,4	1,3	15,4	18,7

CV = Coefficient of variation.

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

Once again, for the two varieties evaluated, the substrates stood out: OBC (55 % and 37 %) (67% and 49%), WRB (52% and 36 %) (52% and 36 %) lower in substrates: WS (46% and 10 %) (66% and 35 %) and RSB (47% and 7 %) (59% and 31%), respectively. [13] points out that in addition to exercising plant support function, the substrate should provide adequate water and air supply to the root system, be free of phytopathogens, easy to manage, low cost, high availability and long durability, characteristics observed in substrates that stood out.

4. Conclusion

The substrates: organic compost + black earth + commercial substrate (OBC) and washed sand + rice straw + black earth (WRB) provided the highest viability and vigour values in white guava seedlings followed by the red guava variety.

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