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Pruning and Fruit Thinning of *Psidium guajava* cv. Paluma under a Seasonal Tropical Climate

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Abstract: Maintaining the plant architecture of *Psidium guajava* L. (guava tree) is essential for enhancing capture and distribution in the plant, directly affecting the fruit quality. The lifespan of the harvest period can be extended by proper pruning. Both timeliness and proper pruning play crucial roles in achieving high-quality fruit production and in maintaining a consistent fruit size while stimulating ascorbic acid levels, sugar content, total soluble solids (TSS), and titratable acidity. From this perspective, this study aimed to characterize the influence of different intensities of fruit pruning and thinning on guava trees grown under a seasonal tropical climate in two growing seasons in Currais, Piauí, Brazil. The experiment was set up in a randomized block design with a $3 \times 3 \times 2$ factorial arrangement corresponding to short, medium, and long pruning intensities and 0%, 10%, and 20% thinning intensities during the two growth seasons, respectively. An analysis was performed to discriminate the treatment groups according to the physicochemical variables of the guava tree cv. Paluma and canonical discriminant analysis. There was significant variation in the SS, titratable acidity, ascorbic acid, and pH contents. Cluster analysis of all treatments allowed division into five different groups for the two pruning times. Canonical discriminant analysis showed that the first two canonical variables explained 91% of the total variance. The fruits of the second harvest exhibited a lower level of acidity, higher levels of soluble solids, and higher levels of ascorbic acid contents. In addition, these fruits also obtained better nutrient contents. Short pruning with up to 20% thinning, medium pruning with up to 10%, and long pruning without thinning favored better levels of macronutrients and micronutrients and, consequently, better fruit quality. Medium or long pruning with up to 20% thinning resulted in higher average fruit weights and nutrient contents (especially of Fe and Cu), lower acidity, and higher ascorbic acid contents. Thus, in general, the importance of production pruning in guava plants is evidenced and thinning of 20% is recommended to improve the fruit quality.

Keywords: *Psidium guajava* L.; physicochemical fruit quality; macronutrients; micronutrients

1. Introduction

Guava (*Psidium guajava* L., Myrtaceae), also known as the "tropical apple" or "poor men's apple", is a popular fruit tree of tropical and subtropical climates, highly appreciated for its exotic flavor and nutritional characteristics [1], with high levels of bioactive compounds [2], phenolic [3–5], and antioxidant [6], as well as minerals [7], and ascorbic acid [8].

In tropical regions (e.g., Brazil), guava trees flower and fruit continuously throughout the year due to their wide edaphoclimatic adaptability [9]. However, the adoption of crop management techniques, such as pruning, has become essential for the commercial control of this species [10]. Pruning can maintain medium-sized plants and facilitate the management of crops, favoring and regulating fruit harvest [10,11].

The process of pruning fruit trees, such as the guava tree, is the cutting and removal of selected parts of a fruit tree, which includes the cutting of branches, sometimes the total removal of smaller branches, and even more shoot and leaf removal. The established practice aims to control growth as a way to identify alterations in the physiology of fruit production, which can generate a greater level of productivity and longevity in the fruit tree [10,12]. However, pruning method efficiency is also crucial, and there are certain restrictions and cooperative practices that can be implemented, such as thinning [10,13].

Different types and intensities of pruning can be carried out throughout the crop, such as fruit thinning, which can be carried out to control the canopy and the seasonality of production, helping to capture and distribute light over the canopy and minimizing pest attack and diseases [11]. Crown management can be carried out to achieve a desirable crown shape, thus ensuring a better operational management, while fruit thinning is mainly carried out to obtain a high-quality fruit production [14], both of which are practices that have been well used in peach and mandarin crops, for example.

The flowering of the guava tree occurs twice a year, usually between the months of April–May and August–September, respectively. During these months, the fruits tend to become ripe in the rainy and winter periods [15]. As a result, especially during the rainy season, greater flowering is observed. However, fruits harvested in the rainy season are rough, tasteless, poor in quality, and less nutritious, and they are subjected to relentless attacks from a wide array of insects, pests, and diseases [15].

Given this scenario, it is therefore essential to search for information on management practices for the fruiting of guava, that is, to seek references under the influence of the pruning and thinning processes of guava in regions of southwest Piauí as a way to maximize the production and commercialization of the fruit in the off-season. From this perspective, this study aimed to characterize the influence of the different intensities of pruning and fruit thinning on seasonal tropical guava trees in two growing seasons in Currais, Piauí, Brazil.

2. Materials and Methods

2.1. Cultivation Area and Plant Material

This study was conducted from the years of 2020 to 2022 at the commercial orchard (Rancho Vale das Serras farm), municipality of Currais, Piauí, Brazil ($-09°00'24''$ S, $-44°24'39''$ W, and altitude of 277 m a.s.l). This region climate is classified as Aw, indicative of a tropical megathermal climate [16], with hot and humid summers during the months of November to April, followed by a clear and dry season in winter during the months of May to October, with July being the driest month (Figure 1). These data were based on the National Institute of Meteorology (INMET) and data from the A326 automatic meteorological station [17]. The total rainfall in the period studied was 3539.0 mm, and the average maximum and minimum temperatures were 34.3 °C and 21.2 °C, respectively. The monthly average relative humidity of the air ranged from 80.6% to 27.4%, respectively.

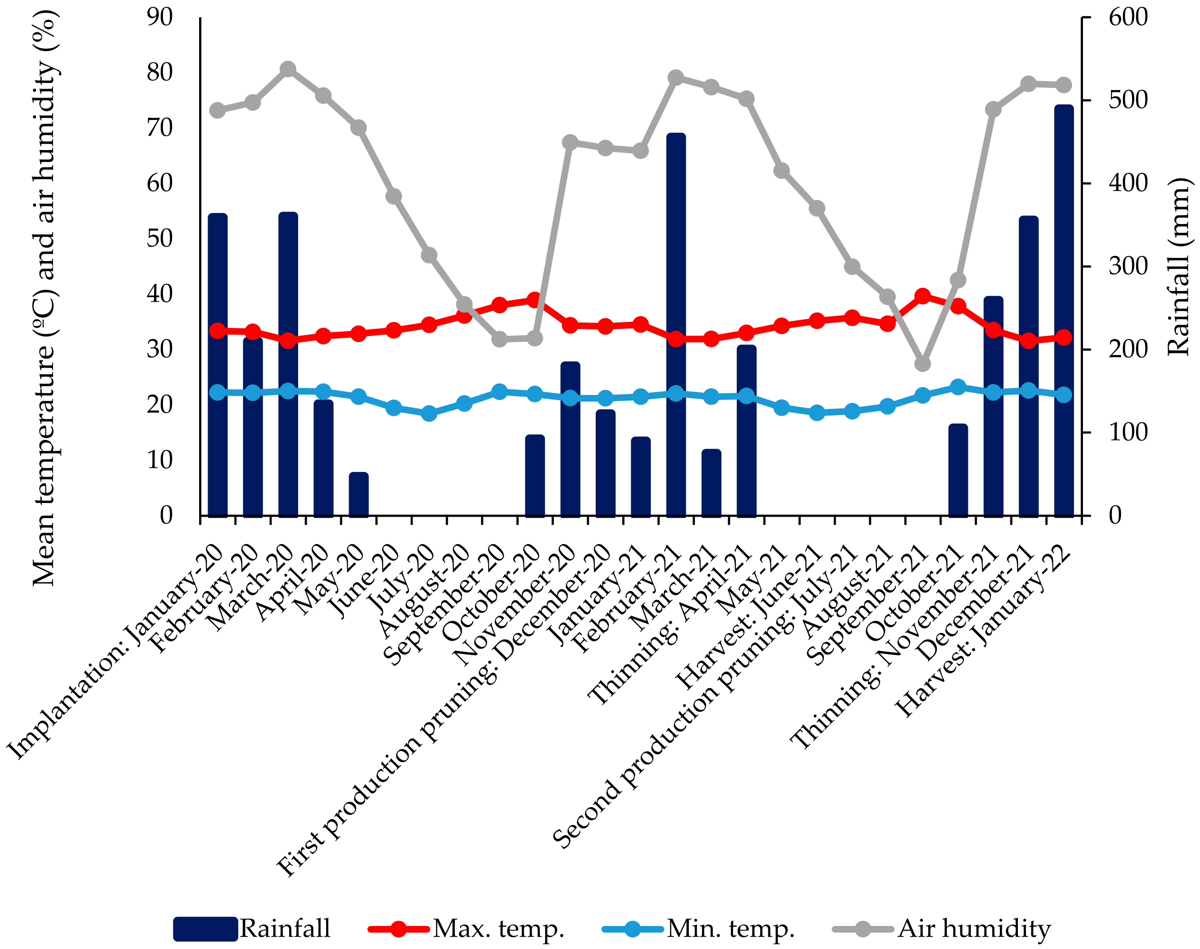

Figure 1. Monthly averages of temperature (T, °C), rainfall (mm), and relative humidity (UR, %) for the experimental regain during two growth seasons from January 2020 to January 2022 by the meteorological station A336 in Bom Jesus, Piauí. Source: the INMET [17].

The soil exhibits a sandy texture and falls under the classification of a Dystrophic Yellow Latosol [18]. Soil physicochemical characteristics were determined prior to the installation of the experiment (Table 1). The experimental area was set up in January 2020 and consisted of guava plants (*Psidium guajava* L.) each spaced 3.0 m between adjacent plants and 4.0 m between rows. A microsprinkler irrigation system was installed in the planting rows, with the emitters spaced every 1.5 m. The organization of this system led to 30 L h^{-1} being emitted with a 2 m flow rate radius.

Table 1. The soil physicochemical properties within the experimental area at a depth of 0–20 cm in Currais, Piauí.

pH	O.M.	P	K^+	Ca^{2+}	Mg^{2+}	Al^{3+}	H + Al	T	SB
H_2O	g kg^{-1}	mg dm^{-3}	cmolc dm^{-3}						
5.0	7.2	1.10	0.1	0.51	0.12	0.40	1.71	2.23	0.62
Cu	Fe	Mn	Zn	V	m	Sand	Silt	Clay	
mg dm^{-3}				%		g kg^{-1}			
0.04	145.3	7.78	0.51	26.8	39.1	804	35	161	

P, K, Cu, Fe, Mn, and Zn—extractor: $Mehlich^{-1}$; Ca, Mg, and Al extractor—KCl—1 M/L; H + Al—calcium acetate extractor at pH 7.0; and organic matter (OM)—Walkley–Black method.

The soil has a high acid pH and a low amount of exchangeable aluminum. The potential acidity was considered low, with the values of calcium, magnesium, and potassium values also low, and consequently, the base saturation was considered low as well. Phosphorus values were also considered low, and the soil organic matter also contained low values. Regarding the granulometric classification, the soil has high values of sand and low values of silt and clay, meaning that it can be interpreted that the soil of the experiment has a low level of natural fertility.

2.2. Cultivation Area and Planting Material

During two production cycles (from 2020 to 2022, respectively), the plants were cultivated in a cup shape, featuring three structural branches growing in different directions. Production pruning in the conduction system was carried out in June 2020. When the branches of new shoots reached approximately 60 cm in length, they were directed towards the formation of the conduction system. The apical bud was removed, thus favoring lignification. Following maturity, the branches underwent production pruning on two occasions: 21 December 2020 (during spring) and 21 July 2021 (in winter), respectively, in different seasons of the year.

Intensities of production pruning were classified according to the distance at which the branches were pruned into short (pruned to 1/3 of the base length), medium (pruned to 1/2 of the base length), and long (pruned to 2/3 of the base length). At each pruning, 12 plants considered homogenous for age, health, height crown shape, and vigor were selected in the plot center.

According to soil analysis, fertilization was performed using an estimated productivity from 20 to 40 t ha^{-1}, which was divided according to the methodology proposed by Lobato and Sousa [19]. Phytosanitary control and weed management (MPD) were carried out periodically. Moreover, crop management practices, such as tying, eliminating extra branches (green pruning), and managing shoots were implemented as needed.

2.3. Experimental Design

The experiment followed a randomized complete block design and was arranged in a $3 \times 3 \times 2$ factorial scheme. The plots were composed of three pruning intensities (short, medium, and long, respectively) and three thinning intensities (0%, 10%, and 20%, respectively) distributed across four blocks, with three plants per plot during the two seasons. The pruning intensities were used according to Bhagawati et al. [20], Kumar et al. [21], and Santos et al. [10].

2.4. Variables Analyzed

After harvesting, five fruits were randomly selected through repetition to perform physicochemical analyses.

2.4.1. Physical Analysis of the Fruits

The fruits were taken to the UFPI/CPCE Phytotechnics Laboratory, where they were weighed (PMF) on a digital scale (model Sf-400).

2.4.2. Chemical Analysis of the Fruits

The fruits were crushed, including of their peel and seeds, to obtain the pulp and determine the hydrogen potential (pH), total soluble solids (TSS), and total titratable acidity (TTA). Then, using fresh guava samples (ripe fruits), the ascorbic acid level as % was determined with K-iodate following the conductance of the chemical and physical methods for food analysis [22].

2.4.3. Analysis of the Macro and Micronutrient Contents in the Fruits

Nutrient contents in the fruits were evaluated based on the chemical analysis of nitrogen (N) by sulfuric digestion, followed by distillation using the Kjeldahl method, and titration with 0.005 M HCl, phosphorus (P) (colorimetric method with sulfomobilidic solutions in the UV–Vis spectrophotometer), potassium (K) (flame photometry method with dried fruit digestion extract), iron (Fe), magnesium (Mg), calcium (Ca), copper (Cu), manganese (Mn), zinc (Zn) (with atomic absorption spectroscopy), and sulfur (S) (with hydrochloric solution and detection using a UV–Vis spectrophotometer) [18].

2.5. Statistical Analysis

Data were submitted to multivariate analysis of normality using the Doornik and Hansen test [23] ($p < 0.05$) and multivariate analysis of variance (MANOVA) using Pillai's trace test at the 5% significance level. Then, the treatments were grouped according to Ward's method (involving the formation of homogeneous groups according to the lowest minimum internal variance) based on the Euclidean distance and the Pearson's correlation coefficient. To discriminate the treatment groups according to the physicochemical variables of the guava tree cv. Paluma, we analyzed the results of the canonical discriminant analysis indicated with a biplot plot constructed for the first two canonical variables. Furthermore, 95% confidence ellipses were generated to identify statistically significant differences ($p < 0.05$) among the treatment groups. The data analyses were conducted using R software, version 3.6.1 [24], and canonical discriminant analysis was executed using the candisc package [25].

3. Results and Discussion

According to the multivariate analysis, a statistically significant difference ($p < 0.01$) between the average vectors of the treatments in the experiment for the interaction between the factors of pruning intensity was detected, with the thinning intensity and pruning time according to the season also analyzed using Pillai's trait test, as displayed in Table 2.

Table 2. Summary of the multivariate analysis of variance for the treatment means considering the physicochemical variables of the fruits of the guava cultivar Paluma subjected to different intensities of pruning and thinning at two pruning times.

				Pillai's Trace	
Statistic	**Value**	**1 num Df**	**2 den Df**	**Approx. F**	**Pr (>F)**
Pruning intensity (IP)	1.501	34	72	6.372	2.390^{-11}
Thinning intensity (IR)	1.056	34	72	2.372	1.073^{-3}
Pruning season (EP)	0.971	17	35	69.671	6.189^{-22}
IP × IR	2.561	68	152	3.980	8.272^{-13}
IP × EP	1.251	34	72	3.538	3.322^{-6}
IR × EP	0.883	34	72	1.674	3.405^{-2}
IP × IR × EP	2.020	68	152	2.281	1.469^{-5}

1 num Df: degrees of freedom of the numerator; 2 den Df: degrees of freedom of the denominator.

Cluster analysis for the evaluated treatments allowed their division into five different groups for the two pruning times (Figure 2). The treatment groups GII (C1 + MP + 0% and C1 + LP + 20%), GIII (C1 + PS + 20%, C1 + PS + 0%, and C1 + PS + 10%), and GIV (C1 + LP + 0%, C1 + LP + 10%, C1 + MP + 10%, and C1 + MP + 20%) were formed by the first pruning season, whereas groups GI (C2 + MP + 20%, C2 + LP + 10%, and C2 + LP + 20%) and GV (C2 + PS + 0%, S2 + PS + 20%, C2 + LP + 0%, C2 + MP + 10%, C2 + PS + 10%, and C2 + MP + 0%) were formed by the second pruning season, respectively.

Canonical discriminant analysis indicated that the first two canonical variables explained 90.50% of the total variance of the original variables (Figure 3). When determining the weight distribution for each variable, the first canonical variable (Can.1) exhibited a stronger correlation with pH, ascorbic acid (AA), P, K, S, N, Mg, Cu, Mn, Fe, and levels of Zn, explaining 81.90% of the original variance. In contrast, the second canonical variable (Can.2) was more strongly correlated with the average fruit weight, Ca, K, FM, soluble solids (SS), and titratable acidity (TA) contents, retaining 8.6% of the original variation.

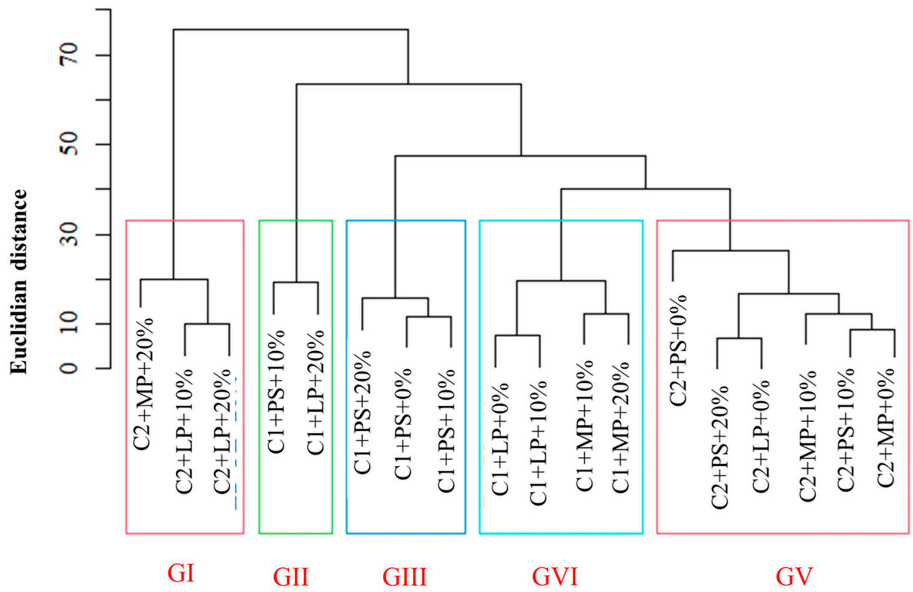

Figure 2. Treatment grouping (GI to GV) using a dendrogram with Euclidean distance, considering the physicochemical variables of guava cv. Paluma.

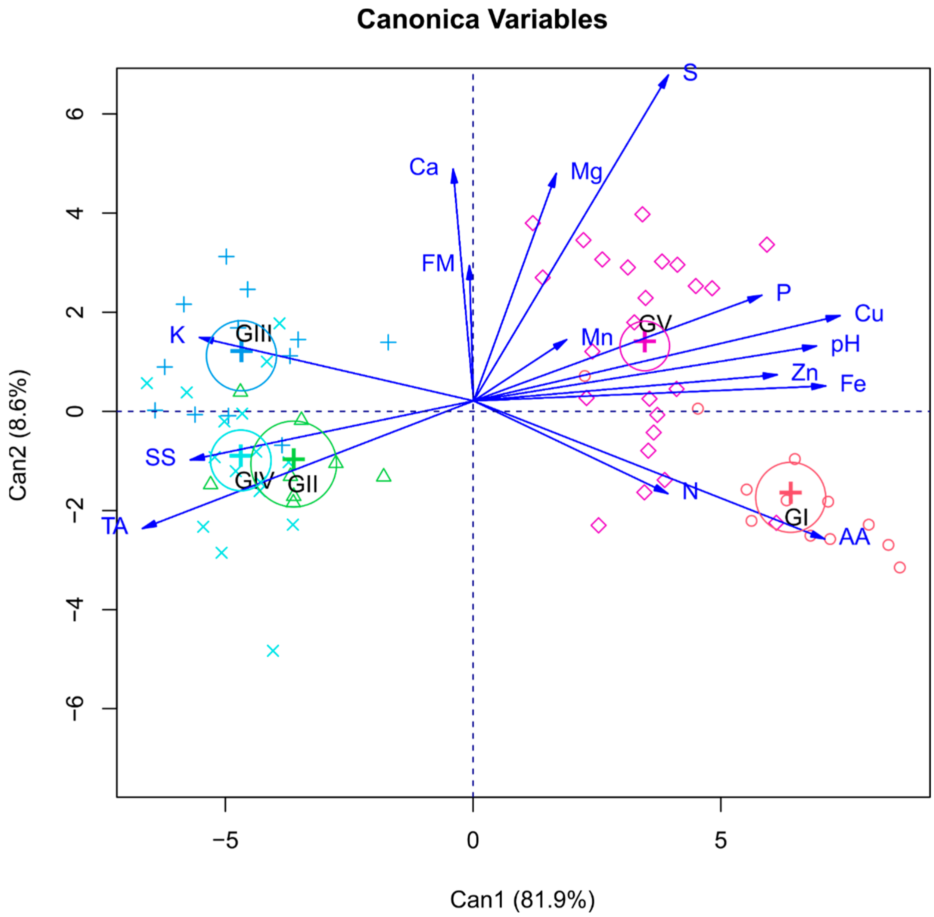

Figure 3. A canonical discriminant analysis indicated the canonical variables Can1 and Can2 for the nutrient contents of guava cv. Paluma. Can1: macronutrients (K, N, P, Ca, Mg, and S), micronutrients (Fe, Zn, Cu, and Mn), and pulp quality variables for the fruits of guava cv. Paluma. Can2: pH, soluble solids (SS), titratable acidity (TA), fruit mass (FM), and ascorbic acid (AA). The groups correspond to the grouping made in Figure 2. The different colors of the symbols in the figure are associated with the different groups being described.

Table 3 shows the mean values corresponding to the groups formed using all the physical–chemical variables involved in the creation of the dendrogram displayed in Figure 2. These data show that there are significant differences for all the variables evaluated ($p < 0.05$) when the five groups were compared using the Scott–Knott test.

Table 3. Mean values and their deviations corresponding to the groups of treatments obtained when making the dendrogram with Euclidean distance (Figure 2) considering the physical–chemical variables of guava cv. Paluma. GI to GV are the formed groups.

Characteristic	Formed Groups (Means ± Standard Deviations) *				
	GI	GII	GIII	GIV	GV
pH	3.85 ± 0.13 a	2.61 ± 0.16 b	2.54 ± 0.13 b	2.90 ± 0.11 b	3.85 ± 0.09 a
SS	11.44 ± 0.39 b	13.88 ± 0.48 a	13.92 ± 0.39 a	13.07 ± 0.34 a	11.0 3 ± 0.28 b
AT	0.81 ± 0.03 b	1.02 ± 0.04 a	1.01 ± 0.03 a	1.08 ± 0.03 a	0.76 ± 0.02 b
FM	148.21 ± 4.78 b	118.07 ± 5.86 c	166.12 ± 4.78 a	144.44 ± 4.14 b	146.13 ± 3.38 b
AA	111.27 ± 2.16 a	80.32 ± 2.65 c	80.50 ± 2.16 c	74.47 ± 1.87 d	88.40 ± 1.53 b
Ca	0.54 ± 0.06 b	0.71 ± 0.08 b	0.69 ± 0.06 b	0.82 ± 0.06 a	0.93 ± 0.05 a
Mg	0.67 ± 0.07 b	0.26 ± 0.,09 c	0.72 ± 0.07 b	0.82 ± 0.06 b	0.98 ± 0.05 a
P	1.44 ± 0.09 a	1.00 ± 0.11 b	0.95 ± 0.09 b	1.09 ± 0.08 b	1.63 ± 0.06 a
K	8.23 ± 0.38 b	9.70 ± 0.46 a	10.63 ± 0.38 a	10.16 ± 0.33 a	8.45 ± 0.27 b
S	2.07 ± 0.10 b	1.54 ± 0.12 c	2.15 ± 0,10 b	1.62 ± 0.08 c	2.39 ± 0.07 a
N	8.50 ± 0.51 a	4.43 ± 0.63 b	5.62 ± 0.51 b	8.17 ± 0.44 a	8.51 ± 0.39 a
Cu	5.99 ± 0.36 a	1.46 ± 0.44 c	1.81 ± 0.36 c	2.30 ± 0.31 c	4.91 ± 0.26 b
Mn	10.14 ± 0.92 a	5.87 ± 1.13 b	7.97 ± 0.92 b	10. 63 ± 0.80 a	10.32 ± 0.65 a
Fe	31.81 ± 1.64 a	9.18 ± 2.00 c	13.53 ±1.64 c	11.69 ± 1.42 c	21.97 ± 1.16 b
Zn	14.09 ± 0.85 a	4.83 ± 1.04 c	8.12 ± 0.85 b	8.98 ± 0.74 b	12.83 ± 0.60 a

* Different lowercase letters on the line indicate significant differences with the Scott–Knott test at 5% probability.

For the physicochemical quality of the pulp, the highest values of the average fruit weight, ascorbic acid (AA), and pH were observed in the second pruning period (Figure 3). The plants of group I that were subjected to medium pruning and 20% thinning and long pruning with 10% and 20% fruit thinning had the highest average fruit weights and AA averages. On the other hand, the highest pH averages were observed in plants of group GV that were subjected to short pruning with 0%, 10%, and 20% thinning, medium pruning with 0% and 10% thinning, and long pruning with 0% thinning, respectively. The results obtained in Figure 3 are complemented with the average results shown in Table 3, which reveals the effectiveness of the multivariate analyses in showing the interactions that occurred between these different treatments when grouped together.

According to Sharma et al. [11], the size, color and nutritional quality of guava fruits are significantly affected by the interventions of conduction and pruning carried out during the postharvest phases. The ascorbic acid content was at its maximum in the green fruit but decreased rapidly with increasing maturity [26].

In Nikumbhe et al. [27], the improvement in the physicochemical characteristics of the fruits was associated with the management of pruning and thinning, so that the age, growth, quality, and precocity of the plant are favored by pruning in the guava tree. The increase in the yield observed was due to the accumulation of photosynthetic photons in the translocation flow of the plant sap. In their study, Santhoshkumar et al. [28] demonstrated that among the different pruning levels (15, 30, 45, and 60 cm, respectively), the average pruning level of 45 cm resulted in robust growth, increased flower production, and higher yields. The number of stomata in the guava leaves also increased when pruned.

Guava is one of the richest sources of ascorbic acid (approximately from 200 to 350 mg/100 g), which generates significant antioxidant potential and can contain from three to four times more ascorbic acid than an orange [29]. Variations in ascorbic acid contents are also due to corrective practices, meaning that high-intensity pruning in combination with thinning can alter physiological mechanisms in guava trees, in addition to seasonal variations in ascorbic acid levels, i.e., an increase in ascorbic acid levels in the winter fruits compared to the fruits collected during the summer season [21].

According to our data in Figure 3, the highest values of soluble solids and titratable acidity were observed during the first pruning season, primarily in the plants subjected to treatments from group GII (medium pruning with 0% thinning and long pruning with 20% thinning) and group GIII (short pruning with 0%, 10%, and 20% thinning).

Fruit acidity is directly correlated with fruit growth and development, which tends to change throughout this process and be influenced by environmental conditions [30]. Guava is a climacteric fruit, and considerable changes in sugar levels may occur during fruit ripening [31]. According to Kumari et al. [21], this phenotypic variation may be associated with nutrient intake, increasing the demand for carbohydrates in the fruit, and producing larger fruits with a higher concentration of total soluble solids.

Bhagawati et al. [20] observed that fruit biochemical properties, total soluble solids, and total sugars increased with improved pruning severity and reported higher TSS, ascorbic acid, total sugar, reducing sugar, and non-reducing sugar contents under more drastic pruning, but much of the productivity and quality of the fruits in the harvests also suffered variations due to the seasonality of the seasons. Araújo Neto et al. [32] observed that regardless of the pruning levels, biochemical changes naturally arise due to the genetic characteristics of the cultivar.

The degradation of proteins and lipids may be a response to the physiological alteration of the fruits, which, due to lower intensity pruning and higher intensity pruning, leads to intermediate product production, including amino acids, and induces the level of acidic organic matter; therefore, energy from ATP continues to be required for the biosynthesis of ripening specific substances during the ripening period, which results in a decrease in the total acid content [33].

With regard to the nutrient content of guava cv. Paluma, the highest levels of macro (except K) and micronutrients were found in the plants subjected to different intensities of pruning and thinning in the second harvest (Figure 3). The probable response to the non-significance of K under more intense pruning and thinning is the reduction of aerial vegetative material, reducing the leaf area, which causes damage to plant metabolism, such as the synthesis of lipids, carbohydrates, and proteins, in addition to the fact that this nutrient can regulate stomatal conductance, which reduces the loss of water and optimizes photosynthetic processes in plants [34].

The analysis of macronutrients exported by the guava tree revealed that the contents of K > N > S > P > Ca and Mg g kg^{-1} were the most exported in descending order in the two seasons studied. In addition, the highest levels of N, S, P, Ca, and Mg were observed in the plants subjected to short pruning with 0%, 10%, and 20% thinning, medium pruning with 0% and 10% thinning, and long pruning with 0% roughing (GV group), respectively. On the other hand, the highest levels of K were observed in the plants that received medium pruning with 0% thinning and long pruning with 20% thinning (group GII), and in plants submitted to short pruning with 0%, 10%, and 20% thinning (group GIII).

The minerals present in the guava fruit play an important role in maintaining proper functioning and good human health. Therefore, the contents of the primary nutrients, such as N, K, and P, are important as a way of understanding the final quality of the harvested fruit [30]. The nutritional composition of the fruit can also be influenced by other factors, such as selected cultivars, edaphic conditions during cycles, corrective management of fertilization, and pruning maintenance practices that can list variations in nutrient content [7].

Thus, Singh et al. [35] noted that severe pruning in guava cultivars stimulates vegetative growth and reduces the number of fruits, thereby reducing the production per plant. However, there is an increase in the source-to-drain ratio, which can increase the nutrient content of the fruits. According to Qin et al. [36], excess foliage and vegetative growth occur due to the high levels of leaf nitrogen displaced to the fruits, thereby justifying the higher N values observed in the experiment.

The greater export of K by the guava fruit has been linked with the role of this element in the transport of soluble solutes and in maintaining the water content of the fruit [37]. In addition to K, N was another macronutrient that was exported at high levels, mainly due to its movement in the phloem, being easily translocated to drainage regions, such as fruits [38].

Greater P availability can be attributed to treatments with less pruning and thinning intensity (with the exception of short pruning) in the second harvest, according to Yang et al. [39], to chelating agents, forming stable complexes with Fe and Al and releasing P into the phloem, thus increasing its content. According to Jayswal et al. [40], these results can also be justified with the accumulation of dry matter due to the greater loss of production branches, generating a greater absorption of nutrients per plant and increasing the levels of P in the guava tree.

Micronutrient contents in guava fruits presented the following descending export order: Fe > Mn > Zn > Cu mg kg^{-1} in the two seasons studied. Plants that received treatments from the GV group, which included short pruning with 0%, 10%, and 20% thinning, medium pruning with 0% and 10% thinning, and long pruning with 0% thinning, exhibited the highest levels of Mn, Zn, and Cu. On the other hand, the highest Fe contents were found in the plants subjected to medium pruning with 20% thinning and long pruning with 10% and 20% thinning (group GI) (Figure 3).

The nutrient composition of guava fruits is affected by several factors, including genetics, irrigation, climatic conditions, environment, fertilization, and soil conditions [30]. From observing the effects of the climatic conditions and morphology on the mineral composition of several guava cultivars from Kenya, Chiveu et al. [7] observed that the sampling technique, analytical method, and genetic differences affected the concentration of these minerals in fruits. Although data on the nutrient composition of guava are scarce, the micronutrient contents of Zn, Fe, Cu, and Mn exported to the guava tree, according to Castañeda et al. [5], are within the daily nutrient needs of humans.

The beneficial effect of pruning has also been attributed to the accumulation of vegetative material in the soil, which generates a greater level of activity of the soil microbiota, accelerating the decomposition and mineralization processes that provide nutrients directly available to the trees along with the solubilizing effect of the fertilizers used. These nutrient sources obtained from organic processes are also known to accelerate photosynthate mobility from the source to the sink due to the release or synthesis of growth hormones that likely promote variation in nutrient contents [41].

Delfim et al. [42] stated that the contents of Zn, Cu, Mn, and Fe are within the standard range of micronutrient contents, and that this adjustment may be related to the soil chemical parameters, such as the correction of acidity by liming, along with the fertilization of fruiting by the guava trees when cultivated in Latosol. Standard values of micronutrients are essential to ensure a sufficient supply of nutrients and to optimize the productivity and physicochemical characteristics of the crop. Furthermore, micronutrients serve as essential components of numerous enzymes that play a direct or indirect role in nitrogen metabolism and carbohydrate synthesis.

Climatic conditions also play an important role in flower pollination and fruiting. High temperatures or unfavorable environmental conditions can influence pollination through rendering pollen and stigma susceptible. Our findings reveal that shoot pruning plays a significant role in enhancing vegetative growth, the source–sink ratio, the photosynthetic capacity of new shoots, flowering characteristics, and fruit quality in various guava cultivars. This improvement leads to higher yields, increased fruit weight and diameter, elevated soluble solids (SS), total sugar, reducing sugar, acidity, and ascorbic acid levels [43].

4. Conclusions

Short pruning with up to 20% thinning, medium pruning with up to 10% thinning, and long pruning without thinning in the second pruning season resulted in a greater export of nutrients and improved the physicochemical quality of the fruits.

Medium or long pruning with 20% thinning in the second pruning provides a higher average fruit weight, nutrient contents (mainly of Fe and Cu), lower acidity, and higher ascorbic acid contents.

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