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PEACH AND NECTARINE FRUIT CHARACTERIZATION FOR SEVERAL NEW CULTIVARS GROWN IN THE BUCHAREST AREA

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Abstract

Fruit physicochemical parameters are essential for evaluating the new cultivars when tested in new planting conditions. The article presents the fruit's biochemical characteristics during four-year research (2019-2022) for 30 peach and nectarine cultivars. The orchard was established in 2017 in the Experimental Field of the Faculty of Horticulture in Bucharest with Romanian and foreign cultivars grafted on Myrobalan 29C, Saint Julien A, Adesoto, and GF677 rootstocks. Vertical Axis and Trident were used as planting systems, and an integrated orchard technology was applied. The size, average weight, flesh firmness, soluble solids, dry matter, titratable acidity, fructose and glucose content, and absorbance index were measured/determined for fruit evaluation. The results present the range intervals for all monitored parameters and the distribution of the cultivars on clusters depending on the physical and biochemical parameters. At the same time, the rootstock and system planting influence on the fruit parameters are highlighted.

Key words*: total soluble solids, dry matter, total acidity, DA-meter.*

INTRODUCTION

The Rosaceae family includes the peach (*Prunus persica* (L.) Batsch) and the nectarine (*Prunus persica* var. *nectarine* Maxim). Due to the fruit's simple adaptability to many ecological situations, early fruit set, and lengthy harvest time, peaches are widely planted. Low winter temperatures and late spring frost at higher elevations limit peaches and nectarines (Kuden et al., 2018). According to FAO data, in 2021, the top-producing nations of peaches and nectarines worldwide were China (8,850,345 tons), Italy (1,466,753 tons), Spain (1,221,698 tons), the United States (1,137,075 tons), Greece (795,851 tons), and Turkiye (555,825 tons). Peach and nectarine production holds a significant global position with a planted area of roughly 1.5 million hectares. Fruit quality in peaches and nectarines is primarily influenced by genotype. Other elements such as rootstock, the location of the fruit in the canopy, pruning and thinning techniques, and the yearly climate are also known to have an impact (Fonti i Forcada et al., 2013). Peaches and nectarines' suitability for consumption primarily depends on their sweetness, and it has been shown that there is a positive correlation between the sugar and malic acid content of the fruits and their flavor (Orazem et al., 2011). Large-fruited nectarines became available in the 1980s, and it was expected that nectarine cultivars would eventually take over the market for fresh *P. persica* in the 21st century (Hough, 1985). Nectarines have increased in popularity over the past 20 years and currently makeup roughly 30% of all peach and nectarine types (Byrne, 2002). Consumer preferences vary depending on consumption patterns, but customers prefer fruits high in sugar yet low in acidity (Rossato et al., 2009). The sugar profile refers to the proportion of each type of sugar in a particular fruit, being quite different from the total sugar content, that is, the sum of the four most significant sugars in fruit (sucrose, glucose, fructose, and sorbitol).

The primary sugar in peach fruit is sucrose (Robertson et al., 1990). This disaccharide is crucial as a fruit flavor antioxidant, sweetener, and energy source (Huberlant & Anderson, 2003). There are also lesser amounts of other sugars, such as glucose, fructose, and sorbitol (Moriguchi et al., 1990).

Since it is sweeter than sucrose and glucose, fructose is a significant monosaccharide in fruit flavor (Pangborn et al., 1963).

Furthermore, because it encourages the growth of bifidobacteria and lactobacilli in the gastrointestinal tract, fructose has been shown to have positive benefits on digestive health (Muir JG et al., 2009).

The present study aims to highlight the qualitative indices and biochemical attributes of 14 peach cultivars and 16 nectarine cultivars to spread the knowledge of this worldwide consumed fruit with essential functions for human health.

MATERIALS AND METHODS

The study was carried out in the experimental field of the Faculty of Horticulture in Bucharest. Both peach and nectarine cultivars were led on two different planting systems: Vertical Axis with 4.0 x 1.5 m (1,666 trees/ha - 1,666 axis/ha) and Trident with 4.0 x 2.0 m (1,250 trees/ha - 3,750 axis/ha). Integrated management, including fertilization, pest and disease management practices, and irrigation, were used to grow the trees. Tree branches were thinned to the same relative fruit: foliage ratio, simulating commercial culture.

The rootstocks were ’GF677’, ’St Julien A’, ’Mirobolan29C’, and ’Adesoto’.

Fruit quality is a broad notion that includes sensory qualities (such as appearance, texture, flavor, and aroma), nutritional value, mechanical qualities, safety, and defects (Crisosto & Costa, 2008). Together, these attributes give the fruit a degree of excellence and an economic value (Abbot, 1999).

To determine the fruit quality parameters, a collection of 30 cultivars (peach and nectarine) was evaluated between 2019 and 2022 for caliber and weight, TSS (total soluble solid), DM (dry matter), titratable acidity (TA), fructose and glucose content, absorbance index (IAD), and fruit flesh firmness.

For each cultivar, 2 or 3 trees were used, and ten fruits per cultivar were sampled in analysis. All fruits were harvested at the commercial ripe stage, when fruits softened, had a yellow or orange ground color (which was also characteristic of each cultivar), and were simple to separate from the tree. To guarantee consistency in maturity grade, one individual only harvested them. Maturity dates ranged from mid-June to mid-September, depending on genotype. The yield (kg per tree) and total number of fruits were recorded for each cultivar. The average weight was estimated using these measurements in 20 fruits in a representative sample (Crisosto et al., 2001). The juice TSS was measured with Krüss DR301-95 refractometer, and data were given as °Brix.

The titratable acidity (TA) was measured in the fresh fruit juice. The fresh juice was measured with a pH electrode and diluted with distilled water for titration to an end pH of 8.1 with 0.1 mol L^{-1} NaOH according to the AOAC method (AOAC, 2001). Data were given as g malic acid per 100 g fresh weight (FW) since this was the dominant organic acid in peach (Wills et al., 1983).

Flesh firmness was determined on opposite sides of the equator of each fruit with a penetrometer Turoni with an 8 mm diameter probe on ten fruits from each tree. Data averages were given in kgf cm^{-2} (Harker et al., 2002).

Dry matter content in a sample was determined by weighing it before and after being incubated at 105°C in a forced air draft oven for 24 hours. The result was expressed as g dry weight (DW) g^{-1} fresh weight (FW) (Di Vaio et al., 2015).

For the descriptive statistics of the data, Microsoft Excel 2016 and IBM SPSS v. 28.0.1.1 with a significance level of $p = 0.05$ were used.

RESULTS AND DISCUSSIONS

At the time of commercial harvest, high variations existed in the values of fruit diameter (Table 1), in peach and nectarine, being influenced by both genotype and canopy shape; the values obtained varied between 50-80 mm.

In nectarine, the Vertical Axis canopy imprinted higher fruit weight values in most cultivars, ranging between 64 g (Early Sun Grand/SJA) and 150 g (Honey Royal/GF677). Fruit diameters were between 55.5-68.73 mm.

Some cultivars, such as Caldessi2000/SJA_A, Nectabelle/GF677_A, and Nectagrand4/SJA_A, exhibited lower fruit diameter. These cultivars tend to produce smaller and lighter fruits, which might be preferred by consumers seeking nectarines with smaller sizes and delicate flavor profiles. Most of the studied nectarine cultivars exhibited moderate diameter values ranging from 54 to 64, representing a balanced fruit size suitable for a wide range of consumer preferences (Table 1).

At the peach cultivars, the Trident canopy shape tended to lead to bigger fruits. Some cultivars, including Royal Summer/GF677_A, Sweet Dream/GF677_A, and Sweet Juana/GF677_A, displayed diameter values ranging between 60 and 64, being into the category of medium-sized fruits, catering to consumers seeking a balanced size and taste experience (Table 1).

Several cultivars, such as Royal Summer/GF677_T and Cardinal/M29C_T, displayed high values exceeding 65, known for producing large and heavy fruits and being visually appealing.

Royal Summer/GF677 cultivar had bigger fruits than Royal Summer/Saint Julien A on both canopy shapes. It produced more than 70% of fruit belonging to the AA category (74-81 mm), conforming to the retail group and supermarket chain standards of European markets (Kader & Mitchell, 1989).

The TSS level of peaches and nectarines showed significant differences among cultivars ranging from 8.00 ± 16.00°Brix (Table 1). All these TSS values were over 8°Brix, considered the minimum TSS established by the European Union to market peaches and nectarines (Commission Regulation 1861/2004). For high-acid cultivars, consumer adoption in American markets was highest when TSS > 10% to 1. In contrast, for low-acid cultivars, the degree of acceptance was at TSS 15% to 16%, above 90% (Crisosto & Crisosto, 2005). Fruit biochemical concentrations at maturity result from changes produced throughout fruit growth. Previous analyses of biochemical compound developmental alterations have mainly concentrated on commercial cultivars. According to (Chapman & Horvat, 1990) and (Chapman et al., 1991), physiological maturity for peaches was characterized by the highest sucrose and lowest quinic acid contents.

The results show a variation in the range of °Brix values among the studied peach and nectarine cultivars.

At nectarines, the Trident canopy registered higher values than the Vertical Axis. Cultivars with the highest TSA values were Nectareine/M29C (14.293°Brix), Honey Late/SJA (13.44°Brix), and Big Top/GF677 (13.75°Brix). The cultivars Big Bang/GF677 (8.733°Brix) and Big Fire/GF677 (9.623°Brix) were the lowest values.

At peaches, most of the cultivars presented similar TSS values on both planting systems, the highest being at Sweet Henry/Adesoto and Sweet Juana/GF677, known for their exceptional sweetness, making them highly desirable for those who prefer intensely sweet flavors.

The lowest values were Sugar Time/Adesoto and Royal Glory/Adesoto, which may have a milder sweetness, appealing to individuals who prefer fruits with a less pronounced sweetness.

Royal Summer on GF677 rootstock registered higher values for TSS than on the SJA.

According to (Moing et al., 2003), peach fruits are typically regarded as inedible when there is a high acid and extremely low sugar content. Changes in sugar and acid concentrations during fruit maturation in *P. persica* have been widely studied (Sandhu et al., 1983; Selli & Sansavini, 1995). In lower levels, sorbitol, a sugar alcohol, is the next most abundant sugar in peach fruits after sucrose, glucose, and fructose (Moriguchi et al., 1990; Robertson et al., 1990). Malic, citric, and quinic acids make up the majority of the acids found in peach fruits (Sweeney et al., 1970; Wills et al., 1983); lesser amounts of shikimic acid have also been found (Wu et al., 2002). Since these sugars and acids were found to have a significant impact on fruit flavor (Sweeney et al., 1970; Jensen, 1985; Esti et al., 1997), we searched to identify patterns between cultivars and system plantings that were linked to the quality of the final fruit.

Typically, the concentration of malic acid increased and then decreased as the fruit developed (Ishida et al., 1971; Liverani & Cangini, 1991). With fruit growth, the concentration of quinoic acid rapidly dropped. According to Chapman & Horvat (1990), quinic acid was the primary acid in young fruits, but it reduced as the fruit grew. Shikimic acid was present in peaches in small amounts (Wills et al., 1983), and (Wu et al., 2002) found that as the fruit matured, the concentration dropped.

Table 1. Caliber, firmness, and total soluble solids (°Brix) at nectarines and peaches between 2019-2022

Genotype/ Rootstock	Fruit weight (g)		Diameter (mm)		Firmness (kgfcm^{-2})		Total soluble solids (°Brix)	
	VA	T	VA	T	VA	T	VA	T
Nectarines								
Early Sun Grand/SJA	64.327^{f}	55.546^{gn}	55.546^{gn}	51.766^{ef}	2.698^{bcdef}	1.872^{efg}	9.077^{d}	10.518^{bcd}
Caldessi2000/SJA	70.085^{ef}	57.562^{g}	57.562^{g}	54.043^{de}	1.848^{g}	2.428^{cde}	7.590^{e}	10.827^{bcd}
Nectagrand1/SJA	73.283^{ef}	54.794^{n}	54.794^{n}	52.312^{ef}	2.001^{fg}	2.805^{cd}	9.160^{d}	10.510^{bcd}
Nectagrand4/SJA	74.463^{ef}	49.906^{i}	49.906^{i}	51.808^{ef}	2.139^{efg}	1.241^{f}	10.558^{bc}	10.573^{bcd}
Guerriera/SJA	81.059^{de}	63.251^{bc}	63.251^{bc}	55.857^{d}	3.383^{ab}	2.936^{bcd}	9.812^{cd}	10.793^{bcd}
Nectabelle/GF677	81.227^{de}	50.204^{i}	50.204^{i}	49.792^{f}	2.023^{fg}	2.459^{cde}	11.930^{a}	10.021^{bcd}
Honey Late/SJA	91.565^{d}	58.686^{ef}	58.686^{ef}	59.907^{c}	3.486^{a}	3.318^{abc}	9.830^{cd}	13.440^{ab}
Nectaross/SJA	95.167^{cd}	61.611^{cd}	61.611^{cd}	59.846^{c}	3.335^{abc}	2.784^{cd}	10.587^{bc}	11.450^{abcd}
Nectareine/M29C	107.477^{bc}	62.679^{bc}	62.679^{bc}	62.490^{bc}	3.319^{abc}	2.567^{cde}	11.987^{a}	14.293^{a}
Stark Red Gold/SJA	110.123^{b}	64.146^{b}	64.146^{b}	61.678^{bc}	2.449^{defg}	3.761^{a}	10.587^{bc}	11.535^{abcd}
Big Bang/GF677	115.620^{b}	53.609^{n}	53.609^{n}	52.293^{ef}	2.958^{abcd}	1.761^{fg}	10.035^{cd}	8.733^{d}
Big Fire/GF677	116.548^{b}	55.672^{gn}	55.672^{gn}	55.929^{d}	2.598^{cdef}	1.954^{efg}	9.560^{cd}	9.623^{cd}
Big Top/GF677	140.807^{a}	57.727^{fg}	57.727^{fg}	56.535^{d}	2.818^{abcde}	3.611^{ab}	12.438^{a}	13.175^{abc}
Maria Anna/SJA	145.954^{a}	63.470^{bc}	63.470^{bc}	62.786^{b}	2.830^{abcde}	2.245^{cde}	12.840^{a}	11.000^{abcd}
Honey Royal/GF677	150.840^{a}	68.731^{a}	68.731^{a}	67.570^{a}	3.072^{abcd}	3.321^{abc}	11.687^{ab}	12.030^{abcd}
Peaches								
Cardinal/M 29C	58.590^{g}	73.892^{n}	50.683^{e}	66.162^{b}	1.548^{fg}	2.808^{bcd}	11.470^{bc}	9.830^{ef}
Royal Summer/SJA	119.800^{cbe}	109.150^{f}	51.080^{e}	59.962^{bc}	2.436^{cde}	2.856^{bc}	8.550^{c}	10.010^{ef}
Sugar Time/Adesoto	87.360^{f}	69.606^{n}	54.361^{d}	55.012^{cd}	1.953^{defg}	1.896^{ef}	8.985^{c}	9.215^{f}
Red Top/M29C	122.100^{cbe}	97.408^{g}	54.501^{d}	60.196^{cb}	1.478^{g}	2.409^{bcde}	10.445^{c}	10.113^{ef}
Royal Glory/Adesoto	135.117^{bce}	112.817^{ef}	58.923^{c}	61.253^{bc}	1.896^{efg}	2.346^{bcde}	8.393^{c}	9.313^{f}
Sweet Henry/Adesoto	82.020^{f}	114.400^{ef}	59.822^{c}	64.700^{b}	2.180^{cdefg}	1.948^{deff}	13.880^{bc}	15.500^{a}
Sweet Juana/GF677	114.808^{be}	115.127^{ef}	60.794^{bc}	61.906^{bc}	2.721^{abcd}	2.944^{bc}	16.258^{a}	13.060^{b}
Royal Jim/Adesoto	109.865^{e}	117.474^{ef}	60.837^{bc}	62.088^{bc}	2.601^{bcde}	2.376^{bcde}	11.583^{bc}	11.248^{d}
Lucius/GF677	116.694^{be}	122.668^{de}	61.196^{bc}	62.088^{bc}	3.416^{a}	4.055^{a}	11.878^{bc}	13.123^{b}
Royal Majestic/Adesoto	124.907^{cbe}	88.440^{g}	61.924^{bc}	55.965^{cd}	2.723^{abcd}	3.230^{b}	10.037^{c}	9.538^{ef}
Sweet Ivan/GF677	138.978^{bc}	136.640^{bc}	63.106^{b}	62.601^{bc}	2.690^{abcd}	2.618^{bcde}	12.000^{bc}	11.583^{cb}
Sweet Dream/GF677	146.375^{ab}	130.193^{cd}	63.430^{b}	65.995^{b}	2.796^{abc}	2.301^{cde}	10.535^{c}	10.671^{de}
Royal Summer/GF677	115.190^{be}	232.212^{a}	63.927^{b}	74.070^{a}	3.253^{ab}	3.100^{bc}	16.630^{a}	11.537^{cb}
Nabby/GF677	117.380^{be}	139.114^{bc}	66.751^{a}	62.601^{bc}	2.674^{abcde}	2.641^{bcde}	9.193^{c}	9.660^{ef}
Gladys/GF677	163.443^{a}	144.870^{b}	66.842^{a}	64.788^{b}	2.278^{cdef}	2.924^{bc}	12.434^{bc}	12.365^{bc}

*VA- Vertical Axis; T - Trident

Table 2. Dry matter, acidity, the ratio between acidity and total soluble content, and absorbance index at nectarines and peaches between 2019-2022

Genotype/ Rootstock	Dry matter (%)		Acidity (mg malic acid/100 g fw)		Acidity/TSS		Total IAD	
	VA	T	VA	T	VA	T	VA	T
Nectarines								
Early Sun Grand/SJA	10.556 ab	11.667 abcdef	0.748 a	0.637 c	0.065 bc	0.066 abc	0.213 de	0.204 f
Caldessi2000/SJA	12.667 a	10.556 def	0.628 abc	0.529 cd	0.083 a	0.053 bcd	0.169 e	0.331 de
Nectagrand1/SJA	10.250 ab	10.222 ef	0.585 bc	0.532 cd	0.070 abc	0.043 cde	0.277 de	0.295 def
Nectagrand4/SJA	11.091 ab	10.889 def	0.644 abc	0.680 bc	0.063 bc	0.055 bcd	0.267 de	0.217 ef
Guerriera/SJA	9.778 b	14.083 a	0.633 abc	0.683 bc	0.064 bc	0.066 abc	0.309 cd	0.328 de
Nectabelle/GF677	12.667 a	11.125 cdef	0.266 ef	0.304 c	0.024 e	0.032 de	0.265 de	0.260 ef
Honey Late/SJA	11.900 ab	14.000 ab	0.381 def	0.333 ec	0.038 de	0.020 e	0.563 b	
Nectaross/SJA	10.625 ab	12.167 abcde	0.779 a	0.908 a	0.078 ab	0.080 a	0.257 de	0.871 a
Nectareine/M29C	10.778 ab	12.636 abcde	0.491 cd	0.512 cde	0.038 de	0.034 de	0.388 c	0.510 c
Stark Red Gold/SJA	12.000 ab	13.000 abcd	0.671 ab	0.875 ab	0.064 bc	0.077 ab	0.737 a	
Big Bang/GF677	9.400 b	9.400 f	0.374 def	0.599 c	0.042 d	0.069 ab	0.312 cd	0.285 def
Big Fire/GF677	10.222 ab	11.375 cdef	0.638 abc	0.665 bc	0.068 abc	0.071 ab	0.187 e	0.189 f
Big Top/GF677	11.083 ab	12.500 abcde	0.429 de	0.501 cde	0.037 de	0.043 cde	0.272 de	0.319 de
Maria Anna/SJA	11.800 ab	11.333 cdef	0.725 ab	0.729 abc	0.058 c	0.065 abc	0.214 de	0.231 ef
Honey Royal/GF677	11.909 ab	13.700 abc	0.285 ef	0.618 c	0.026 de	0.056 abcd	0.388 c	0.374 d
Peaches								
Cardinal/M 29C	11.333 bce	10.571 cdef	2.473 a	0.669 a		0.063 bc		0.387 bc
Royal Summer/SJA	11.833 a	10.667 cde	0.477 b	0.237 c	0.056 c	0.022 b	0.383 dce	0.291 cd
Sugar Time/Adesoto	9.833 cd	9.286 ef	1.188 b	0.276 c	0.023 c	0.034 bc	0.230 ce	0.365 bcd
Red Top/M29C	7.333 d	10.756 bcde	0.398 b	0.359 bc	0.266 a	0.041 bc	0.200 e	0.296 cd
Royal Glory/Adesoto	9.889 cd	10.126 def	0.266 b	0.225 c	0.080 bc	0.036 bc	0.602 ab	0.415 bc
Sweet Henry/Adesoto	14.273 b	13.017 abcd	1.013 b	0.670 a	0.062 c	0.043 bc	0.439 bc	0.300 cd
Sweet Juana/GF677	14.000 bc	13.657 ab	0.718 b	0.315 bc	0.031 c	0.018 b	0.419 bcd	0.605 a
Royal Jim/Adesoto	11.083 bcd	11.487 abcde	1.040 b	0.501 ab	0.211 ab	0.116 ab	0.674 a	0.597 a
Lucius/GF677	14.000 bc	14.253 a	0.919 b	0.156 c	0.053 c	0.012 b	0.468 bc	0.597 a
Royal Majestic/Adesoto	10.556 bcd	9.333 ef	1.111 b	0.618 a	0.108 bc	0.061 bc	0.420 bcd	0.453 abc
Sweet Ivan/GF677	11.769 bc	13.749 a	0.418 b	0.152 c	0.028 c	0.016 b	0.466 bc	0.514 ab
Sweet Dream/GF677	11.667 bc	9.314 ef	0.245 b	0.343 bc	0.146 abc	0.170 a	0.462 bc	0.315 cd
Royal Summer/GF677	11.833 bc	13.167 abc	0.357 b	0.288 bc	0.029 c	0.191 a	0.416 bcd	0.329 cd
Nabby/GF677	10.667 bcd	10.398 cdef	0.950 b	0.378 bc	0.028 c	0.038 bc	0.410 bcd	0.476 abc
Gladys/GF677	14.000 bc	13.003 abcd	0.714 b	0.604 a	0.138 abc	0.040 bc	0.548 abc	0.401 bc

*VA- Vertical Axis; T - Trident

The significant differences in several sugar traits observed between the cultivars confirmed the effect of sugar composition on the sensory quality of peach fruit (Colaric et al., 2005).

Conversely, their high acidity often favored yellow-fleshed peach and nectarine cultivars in Europe and America. As shown, sugar and acidity varied considerably for both white and yellow-fleshed peaches and nectarines (Day et al., 1997)

In the history of peach and nectarine breeding, fruit total acidity was a quality parameter that suffered changes in the newest cultivars.

In our collection, low acidity nectarines were Nectabelle/GF677, Honey Late/SJA, and Big Bang/GF677, and peaches were Royal Summer/SJA, Red Top/M29C, Royal Glory/Adesoto, Sweet Ivan/GF677, Sweet Dream/GF677, and Royal Summer/GF677.

The dry matter content in nectarines and peaches, Trident, and Vertical Axis had similar values to more cultivars (Table 2). At nectarines, varied between 9.4-14.083%, these values provide insights into the characteristics and properties of these cultivars.

Cultivars registered the highest values.

Guerriera/SJA_T and Honey Late/SJA_T, and the lowest by Big Bang/GF677 and Nectagrand1/SJA.

At peaches, the highest values were at Sweet Henry/Adesoto_A, Sweet Juana/GF677_A, Lucius/GF677_A, and Gladys/GF677_A.

Absorbance index (IAD) presented the maturity level according to this parameter that was analyzed in the fruits, most of the values being under 0.4.

The 14 peach and 16 nectarine cultivars (2019-2022) were grouped after the fruit traits using hierarchical clusters (Wanpeng et al., 2017; da Silva Torres et al., 2006).

At nectarines, five groups were formed for the basic parameters (a) Big Fire/GF677_T, Caldessi 2000/SJA_t, Nectagrand1/SJA_T, Maria Anna/SJA_T, Nectareine/M29C_A, Nectarine/M29C_t, Stark Red Gold/SJA_T, Guerriera/SJA_T, and Honey Royal/GF677_T; (b) Nectaross/SJA_A, Stark Red Gold/SJA_A, Honey Late/SJA_T, Nectagrand4/SJA_T, Big Top_GF677_A, Honey Late/SJA_A, Big Bang/GF677_A, Nectagrand4/SJA_A, Nectabelle/GF677_T; (c) Big Top/GF677_T, Nectaross/SJA_T, Big Bang/GF677_T; (d) Big Fire/GF677_A, Early Sun Grand/SJA_A, Caldessi 2000/SJA_A, Nectabelle/SJA_A, and Nectagrand1/SJA_A; (e) Maria Anna/SJA_A, Honey Royal/GF677/A, Early Sun Grand/SJA_T, and Guerriera/SJA_A (Figure 1). Nectareine/M29C and Nectagrand4/SJA presented a similar profile in both planting systems, while the others differed.

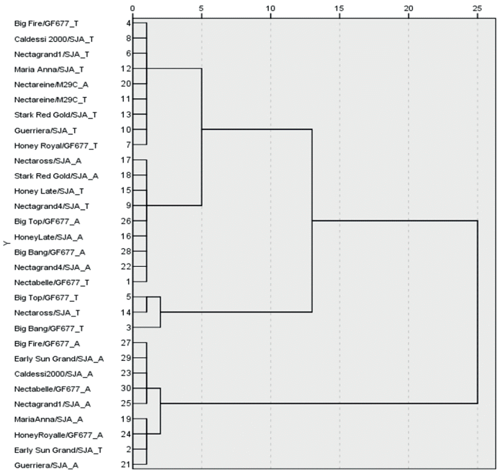

Figure 1. Nectarine cultivars grouped by fruit quality parameters

At peach, four groups were presented (a) Sweet Dream/GF677_A, Royal Glory/Adesoto_A, Royal Jim/Adesoto_T, Sweet Juana/GF677_T, Lucius/GF677_A, Red Top/M29C, Royal Majestic/Adesoto_T, Royal Jim/Adesoto_A, Royal Glory/Adesoto_T, Sweet Ivan/GF677_T, Sweet Juana/GF677_A, and Royal Summer/SJA_A; (b) Royal Summer/SJA_T, Sweet Ivan/GF677_A, Gladys/GF677_A, and Nabby/GF677_A; (c) Red Top/M29C_T, and Springbelle/M29C; (d) Sweet Henry/Adesoto_T, Sweet Henry/Adesoto_A, Gladys/GF677_T, Lucius/GF677_T, Cardinal/M29C_T, Nabby/GF677_T, Sweet dream/GF677_T, and Sugar Time/Adesoto_A; (e) Royal Majestic/Adesoto_A.

Royal Jim/Adesoto, Royal Glory/Adesoto, Sweet Juana/GF677, and Sweet Henry/Adesoto presented the same profile in both planting systems (Figure 2).

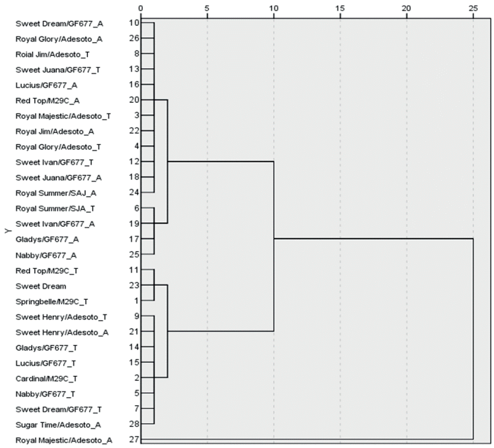

Figure 2. Peach cultivars grouped by fruit quality parameters

CONCLUSIONS

The caliber values from moderate-sized fruits suitable for various uses to larger-sized fruits with visually appealing characteristics, growers and consumers have a wide range of options to select from based on their preferences. The values were between 50-80 mm. Royal Summer/GF677 has bigger fruits than Royal Summer/Saint Julien A on both canopy shapes. Trident has bigger fruits than Vertical Axis at peach.

For total soluble solids (°Brix), the values ranged between 8-15°Brix, highlighting a wide range of sweetness levels when cultivars exhibiting exceptional sweetness are highly appreciated. Cultivars with moderate sugar content and suitable performance could balance flavor and tree management. Further research can explore additional sensory attributes and evaluate the performance of different canopy shapes to optimize fruit production and enhance consumer satisfaction.

Dry matter content varied between 7-15%. The titratable acidity content recorded higher values on the Trident canopy in some cultivars. It is important to note that taste preferences can vary among individuals, and some may prefer fruits with higher or lower acidity levels based on personal preferences. Other factors, such as sweetness, aroma, texture, and overall fruit quality, also contribute to the appreciation of a cultivar.

When evaluating the characteristics and properties of these cultivars, it is crucial to consider a combination of factors, including titratable acidity, dry matter concentration, fruit size, and adaptability to specific growing conditions, to determine their overall desirability and suitability for different uses.

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