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## Characterization and Evaluation of Some New Sweet Grape Cultivars Under Egyptian Conditions

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### ABSTRACT

This study was carried out for two successive seasons 2022 and 2023 on five-year-old grapevines to evaluate new grape cultivars namely Sweet Sapphire, Sweet Celebration, Sweet Globe and Sweet Joy grafted on 1103 Paulsen. The vines were cultivated in the El-Rawda vineyard located in the El-Nubaria region and were planted in sandy clay loam soil. Results showed that in both seasons, Sweet Celebration had significantly lower leaf area than the tested cultivars. However, there were no significant differences among the remaining cultivars. In the first season, Sweet Celebration had remarkably higher internode length than Sweet Globe and Sweet Sapphire cultivars. In the first season, Sweet Globe and Sweet Sapphire had considerably greater internode thickness than Sweet Celebration. In the first season, Sweet Sapphire and Sweet Globe had significantly higher internode numbers than Sweet Joy and Sweet Celebration. In the first season, Sweet Sapphire had remarkably shorter cane length than the other varieties. In both seasons, Sweet Celebration had significantly lower pruning wood weight than the studied cultivars. In both seasons, Sweet Joy and Sweet Globe had highly significant trunk thickness as compared with the Sweet Celebration cultivar. Sweet Globe had remarkably the greatest number of clusters and bud fertility percent in both seasons. Sweet Sapphire had significantly the highest berry weight, berry size, weight of 100 berries, size of 100 berries and juice volume in both seasons. Besides, in both seasons, Sweet Sapphire recorded remarkably the greatest average cluster weight, cluster length, berry length, yield per vine and productivity per feddan. Also, in both seasons, Sweet Sapphire had considerably the greatest L/D ratio. Meanwhile, in both seasons, Sweet Sapphire had the significantly lowest berry diameter, in the meantime, there were no significant differences among the other cultivars. In both seasons, Sweet Joy gave significantly the greatest berries number, while Sweet Sapphire recorded considerably the lowest value. Concerning shape and berry colour, Sweet Sapphire was unusually berries of tubular, an elongated, crispy pulp and black skin. Sweet Celebration had oval berries, very crunchy and dark red colour. Sweet Globe had large, round berries and very crispy and yellowish-green skin. Sweet Joy recorded elongated oval, firm flesh and black colour. There were no found seeds and shot berries for all the tested cultivars. In both seasons, berry adherence strength was not significantly influenced by the studied cultivars. Sweet Globe had the remarkably highest moisture content in the second season. All the studied cultivars are considered medium-ripening. Sweet Celebration had a highly significant TSS and TSS/acidity ratio in both seasons. Acidity was not remarkably affected by the tested varieties in both seasons. We recommend that the Sweet Sapphire cultivar be grown in the El-Nubaria region because it has the significantly highest yield and high fruit quality.

### INTRODUCTION

Grapes are considered one of the most important fruit crops in the world and in Egypt. Plant variety and cultivar identification are some of the most important aspects of agricultural systems. The large number of grape cultivars exceeds 13,000, representing a relatively large grape diversity (OIV, (2013). Cultivar identification and description are necessary stage in breeding programs, germplasm improvement and preservation and monitoring genetic diversity (Baraket, *et al.*, 2010). Grape cultivars can be identified in some ways: (1) morphological illustration of grape vine parts (leaves, shoots, buds, bunches, berries, etc.) at various phenological stages (Olv, 2013). (2) Morphometry depends on the assessment of plant organs' properties and phenological periods, i.e., time of bud burst, flowering, veraison and ripening

(Keller, 2020). (3) A DNA marker system should be involved as additional 'descriptors' for varietal identification to establish a 'DNA-based ampelographic system (Halasz, *et al.*, 2005). Sweet Sapphire is a hybrid created by cross-breeding Beitamouni with C 22-121. Sweet Celebration is a combination of Red Globe and Princess. Sweet Globe is crossbred between Usda selection B31-164 and Princess. Sweet Joy is mixed between Autumn Royal seedless and an unknown second parent (Akkurt *et al.*, 2019). Preceding investigations were carried out for the determination and properties of the grape varieties. Gaser *et al.* (2023), Essa *et al.* (2019), El-Morsy *et al.* (2017), Ahmed and Abd-Aziz and Mohamed and Khaiery (2017). This investigation targeted the evaluation of vegetative growth, yield and fruit quality of Sweet grape cultivars as indicators of the recommendation of

new table grape cultivars for the Nubaria region conditions.

### MATERIALS AND METHODS

This study was carried out for two successive seasons, 2022 and 2023, on five-year-old grapevines involving four cultivars, Sweet Sapphire, Sweet Celebration, Sweet Globe and Sweet Joy, grafted on 1103 Paulsen rootstock. Vines were cultivated in the El-Rawda vineyard located in the El-Nubaria region, El-Behera governorate, Egypt. The vines were planted in sandy clay loam soil spaced 2x3 meters apart and irrigated by the drip irrigation system. Vines were cane pruned and trellised by the Spanish Parron system. The vines were pruned during the first week of January for the two seasons of the investigation to reach a load of 72 eyes per vine (12 canes X 6 buds per vine). Four replicates for each cultivar were chosen and each replicate contained five vines. All agricultural practices were performed according to the recommendations of the Ministry of Agriculture. The weather cases during the experiment were as follows: average air temperature (22.8°C) and relative humidity (50.6%). Soil and irrigation water samples were taken for physical and chemical analysis (Tables 1 and 2).

#### The following characteristics were investigated:

- 1- Dates of phenological stages
- 2- Young shoot description
- 3- Leaf characteristics (Leaf teeth number, leaf length (cm), leaf width (cm), leaf area (cm<sup>2</sup>), Leaf petiole length (cm), leaf lobes number and hairs)
- 4- Cane characteristics (internode length (cm), internode thickness, internodes number, cane length (cm) and pruning wood weight (g))
- 5- Trunk thickness (cm)
- 7- Clusters number and bud fertility percent
- 8- Physical berry characteristics (berry weight (g), berry size (cm<sup>3</sup>), weight of 100 berries (g), size of 100 berries (cm<sup>3</sup>), juice volume (ml), average cluster weight (g), cluster length (cm), cluster width (cm), yield per vine (Kg), productivity per feddan (ton), berry length (cm), berry diameter (cm), berry length/berry diameter ratio (L/D

ratio), berry shape, shot berries, seeds, berries numbers, berry colour, moisture content % and berry adherence strength (g) were determined using the instrument described by Ewada (2008).

#### 9-Chemical berry characteristics (Total soluble solids (T.S.S %), acidity (%) and T.S.S/ acidity ratio)

The number of clusters was counted, and the bud fertility percent was calculated by dividing the average number of bunches per vine by the total number of buds per vine. Thinning of clusters left 26 clusters per vine for the tested cultivars. At growth cessation, the shoot length average (cm) was estimated after measuring the length of the five shoots on each vine. The average number of leaves was calculated by counting the leaves on the five shoots per vine. Leaf area (cm<sup>2</sup>), which was taken from ten mature leaves from those opposite the basal clusters on the main shoot per vine was estimated by planimeter. Vines were harvested when TSS reached about (16-17%) according to Essa *et al* (2019), and the total yield (Kg) for each experimental vine was determined as ( the average cluster weight (g) x the number of clusters per vine). Productivity per feddan was calculated as (average yield per vine × number of vines per feddan). Six representative clusters per vine replicate were chosen for quality determination. To estimate berry quality parameters at harvest, the average of hundred representative berries per replicate was reported as one replicate per treatment. Berries weight (g) was recorded by a weighing balance, the size of the berries was determined by water displaced through a measuring cylinder, and juice volume was calculated by measuring the cylinder. Berry diameter and length were recorded by the vernier dermis.

Cluster length and width were determined by a ruler, and the number of berries per bunch was counted. Berries juice total soluble solids (TSS) percent was estimated by a refractometer (Atago ATC-1,-Japan).

**Table 1: Physical and chemical analysis of experimental soil**

Depth (cm)	Texture	Ph	E.C (ds/m)	Total CaCO <sub>3</sub> (%)	O.M (%)	Soluble cations (meq/l)			Soluble anions (meq/l)		
						Ca+	Mg <sup>++</sup>	K+	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
0-30	Sandy clay loam	7.73	7.07	25.2	0.63	18	14	3.4	6	37	41.7
30-60	Sandy clay loam	7.67	6.22	24.2	0.63	19	17	2.4	10	25	39.9
60-90	Sandy clay loam	7.36	14.75	23.4	0.70	30	28	6.4	5	83	87.1

**Table 2: Chemical properties of experimental water**

Sample	PH	E.C (Ds/M)	Soluble salts (meq/l)							
			Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
Water irrigation	8.23	0.73	2.6	1.6	2.8	0.2	—	2.2	2.8	2.2

Juice titratable acidity (TA) percent as tartaric acid equivalent was determined by diluting the juice with distilled water and titrating it with 0.1 N sodium hydroxide to the endpoint of the phenolphthalein indicator (A.O.A.C., 2012).

TSS/Acid ratio was also counted. The experiment was carried out in a randomized complete block design of four replication. Analysis of variance was performed according to Gomez and Gomez (1984) using SAS (Statistical Analysis System) version 9.1(2002). Comparison of means was carried out using the least significant difference (LSD) at 0.05 level of probability.

## RESULTS AND DISCUSSION

The dates of phonological stages are shown in Table (3). Sweet Joy had the first bud burst, while Sweet Sapphire recorded the last variety. Sweet Joy and Sweet Globe were initially flowering, but sweet celebration was the farthest cultivar. Sweet Globe had the earliest fruit set, while Sweet Celebration recorded the final cultivar. Sweet Joy and Sweet Sapphire (the black cultivars) gave the initial colouring, but Sweet Celebration was the ultimate cultivar. Sweet Sapphire and Sweet Celebration had the early ripening, while Sweet Joy recorded the remotest variety.

Days number from flowering to ripening: Arrangement of cultivars from the lowest to the highest: Sweet Celebration- Sweet Sapphire-Sweet Globe-Sweet Joy (Table 4). The results attained are in harmony with Gaser *et al* (2023) observed that Starlight and Sugrafourteen grapes (red cultivars) were early berry ripening, while Midnight Beauty grape (black colour) and Autumn Crisp (yellowish green) had early to medium and late, respectively. In addition, El-Morsy *et al* (2017) observed that Arra 29 grape (red cultivar) was early ripening and Arra 13 (red colour) had mid-early ripening but Arra 27(black skin) and Arra 15 (white cultivar) were mid-late ripening.

Young shoot description: The colour of the young shoot is green, in the meantime, there were no found hairs for the tested cultivars. In this respect, Gaser *et al* (2023) observed that young shoots of Midnight Beauty (black cultivar) and Autumn Crisp (yellowish green) were absent hairs.

Leaf teeth number: In the first season, Sweet Celebration had significantly lower leaf teeth number than the other cultivars, at the same time, there were no significant differences among the remaining cultivars. In the second season, leaf teeth were not considerably affected by the studied cultivars (Table 5). In this respect, Gaser *et al* (2023) found that the number of teeth was lower in Starlight (pink cultivar) than in Midnight Beauty (black skin) and Autumn Crisp (yellowish green colour).

Leaf length: There were no significant differences among the tested varieties concerning leaf length in both seasons (Table 6).

Leaf width: Sweet Joy gave the significantly highest leaf width, while Sweet Celebration recorded the remarkably lowest value in the only first season. However, leaf width was not significantly influenced by the studied cultivars in the second season (Table 6).

Leaf area: In both seasons, Sweet Celebration had considerably lower leaf area than the tested cultivars, in the meantime, there were no significant differences among the remaining cultivars (Table 6). These results agreed with Essa *et al* (2019) observed that Matrouh Eswed grape (black cultivar) had significantly the largest average leaf area. Besides, Mohamed and Khaiery (2017) reported that sable, Midnight Beauty and Desert Red grape cultivars (black colour) had a large leaf area. On the other hand, Ahmed and Abd El-Aziz (2021) found that Starlight grape (pink cultivar) had a lower leaf area than Early and Prime grape cultivars (white skin).

Leaf petiole length: In the first season, Sweet Joy and Sweet Globe had remarkably higher leaf petiole length than Sweet Celebration. Meanwhile, there were no significant differences among the studied cultivars in the second season (Table 5). Some studies are in line with the above-mentioned results of Ahmed and Abd El-Aziz (2021) observed that the petiole of the prime grape (white cultivar) was taller than Starlight grape (pink skin). Also, Mohamed and Khaiery (2017) reported that the petiole length of the sable grape (black cultivar) was long.

Leaf lobes number: In both season seasons, leaf lobes number was stable in all the tested varieties (Table 5). Our results agree with some studies by Mohamed and Khaiery (2017) observed that there were no significant differences among Sable, Midnight Beauty and Desert Red grapes (black cultivars) regarding a number of lobes. Besides, Ahmed and Ahmed and Abd El-Aziz (2021) found that lobes number was not remarkably influenced by the studied cultivars namely, Prime grape (white skin), Early Sweet (white colour) and Starlight (Pink cultivar).

Hairs: There were no found hairs on the leaves of all cultivars in both seasons.

Leaves number: In the first season, leaves number was not remarkably influenced by the studied cultivars. Meanwhile, Sweet Globe recorded the significantly greatest leaves number in the second season, at the same time, there were no significant differences among the other varieties (Table 7).

**Table 3: Dates of phenological stages of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Initial bud burst	Initial bud burst	Initial flowering	Initial flowering	Initial fruit set	Initial fruit set	Initial colouring	Initial colouring	Initial ripening	Initial ripening
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023
Sweet Sapphire	5 Feb	10 Feb	26 Mar	25 Mar	14 Apr	11 Apr	16 May	14 May	1 Jul	30 Jun
Sweet Celebration	4 Feb	2 Feb	8 Apr	30 Mar	20 Apr	14 Apr	30 May	23 May	3 Jul	28 Jun
Sweet Globe	5 Feb	2 Feb	25 Mar	21 Mar	10 Apr	5 Apr	19 May	17 May	3 Jul	1 Jul
Sweet Joy	2 Feb	1 Feb	24 Mar	21 Mar	12 Apr	9 Apr	16 May	14 May	4 Jul	3 Jul

**Table 4: Days number from flowering to ripening of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	2022	2023
	Sweet Sapphire	96
Sweet Celebration	86	89
Sweet Globe	98	101
Sweet Joy	101	103

**Table 5: Leaf characteristics of Sweet grape cultivars in the 2022 and 2023 seasons.**

Character Cultivar	Leaf teeth number	Leaf teeth number	Leaf lobes number	Leaf lobes number	Leaf petiole length	Leaf petiole length
	2022	2023	2022	2023	2022	2023
Sweet Sapphire	80.75	81.87	3.00	3.25	6.10	6.38
Sweet Celebration	75.37	75.62	3.00	3.25	5.60	5.78
Sweet Globe	83.75	83.00	3.25	3.00	6.30	6.35
Sweet Joy	83.25	82.12	3.00	3.00	6.62	6.13
L.S.D.(0.05)	3.95	N.S	N.S	N.S	0.41	N.S

Shoot length: Sweet Celebration and Sweet Globe had significantly highest in the first and second seasons, respectively. However, Sweet Joy had the lowest shoot length in both seasons (Table 7). These findings are in agreement with those gained by Ismail (1989) noted that the greatest average shoot length was attained from the Cardinal grape (red skin) followed by the Emerald Seedless grape (white cultivar) followed by the Queen grape (red colour), while the Beauty Seedless grape (black cultivar) recorded the lowest value.

#### Cane characteristics:

Internode length: In the first season, Sweet Celebration had considerably higher internode length than Sweet Globe and Sweet Sapphire cultivars. On the other hand, there were no significant differences among the studied varieties in the second season (Table 8). El-Morsy *et al* (2017) found that the length of the internode for Arra29 and Arra13 (red grape cultivars) was long. Besides, Gaser *et al* (2023) reported that the same result was observed for starlight and sugrafourteen (red cultivars).

Internode thickness: In the first season, Sweet Globe and Sweet Sapphire had significantly greater internode thickness than Sweet Celebration. In the second season, internode thickness was not affected by the tested cultivars (Table 8). El-Morsy *et al* (2017) worked on Arra 24 (black cultivar) and Arra

30 (white cultivar) and observed that these cultivars had high internode thickness. Furthermore, Gaser *et al* (2023) found that the same trend was observed with starlight and sugrafourteen cultivars.

Internodes number: Sweet Sapphire and Sweet Globe had remarkably higher number of internodes than Sweet Joy and Sweet Celebration in the first season. However, there were no significant differences among the studied varieties in the second season (Table 8).

#### Leaf characteristics:

Cane length: In the first season, Sweet Sapphire had significantly shorter cane length than the other varieties. On the other hand, there were no significant differences among the remaining cultivars. In the second season, can length was not considerably influenced by the tested cultivars. In this respect, El-Mogy (2006) reported that the highest yield with high fruit quality of Crimson grape (red cultivar) was gained with cane length (10-15 buds/cane). Also, Ali *et al* (2000) showed that number of bunches and fertility coefficients of Thompson Seedless (white colour) were increased at cane lengths 8 and 12 buds/cane.

Pruning wood weight: In both seasons, Sweet Celebration had remarkably lower pruning wood weight than the tested cultivars. However, there were no significant differences among the remaining cultivars (Table 9). The results are in harmony with

Essa *et al* (2019) revealed that Matrouh Eswed grape (black skin) had the significantly high weight of pruning. In addition, Sabry *et al* (2009) indicated that the greatest weight of pruning was attained from the Black Monuka grape (black cultivar) followed by the Rich Baba grape (white colour), while the Red Globe grape recorded the lowest weight of pruning.

Trunk thickness: In both seasons, Sweet Joy and Sweet Globe cultivars had highly significant trunk thicknesses as compared with Sweet Celebration cultivar (Table 9).

Clusters number and bud fertility%: The descending order of the studied cultivars according to the number of clusters and bud fertility percent in

both seasons is as follows: Sweet Globe- Sweet Sapphire - Sweet Celebration -Sweet Joy (Table 14). The results obtained are in agreement with those stated by El-Morsy *et al* (2023) found that the highest coefficient of bud fertility was obtained in Arra 24 (black cultivar) and Arra 30 (white cultivar). In addition, Gaser *et al* (2023) showed that the high bud fertility was in Autumn crisp cv. (white cultivar).

**Physical berry characteristics:**

Weight and size of 100 and juice volume: In both seasons, Sweet Sapphire had the significantly highest berry weight, berry size, weight of 100 berries, size of 100 berries and juice volume. However, there were no significant differences among the other cultivars. (Tables 11 and 12).

**Table 6: Leaf characteristics of Sweet grape cultivars in the 2022 and 2023 seasons.**

Character Cultivar	Leaf length	Leaf length	Leaf width	Leaf width	Leaf area	Leaf area
	2022	2023	2022	2023	2022	2023
Sweet Sapphire	14.11	14.05	12.27	12.41	152.87	151.50
Sweet Celebration	13.28	13.57	11.76	11.90	148.00	148.37
Sweet Globe	14.02	13.83	12.32	12.13	154.25	154.12
Sweet Joy	14.00	13.97	12.91	12.35	153.00	153.37
L.S.D.(0.05)	N.S	N.S	0.63	N.S	2.27	3.34

**Table 7: Leaves number and shoot length of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Leaves number	Leaves number	Shoot length	Shoot length
	2022	2023	2022	2023
Sweet Sapphire	26.25	41.00	69.25	71.12
Sweet Celebration	26.00	41.25	74.25	72.25
Sweet Globe	27.00	44.75	70.87	77.00
Sweet Joy	26.00	40.00	69.25	68.75
L.S.D.(0.05)	N.S	0.18	3.44	3.38

**Table 8: Cane characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Internodes length	Internodes length	Internodes thickness	Internodes thickness	Internodes number	Internodes number
	2022	2023	2022	2023	2022	2023
Sweet Sapphire	7.50	7.50	0.85	0.82	24.25	23.50
Sweet Celebration	8.50	8.25	0.72	0.75	22.25	22.00
Sweet Globe	7.62	8.12	0.85	0.85	24.00	23.62
Sweet Joy	8.25	8.00	0.78	0.82	23.25	23.75
L.S.D.(0.05)	0.78	N.S	0.07	N.S	0.74	N.S

**Table 9: Cane length, pruning wood weight and trunk thickness of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Cane length	Cane length	Pruning wood weight	Pruning wood weight	Trunk thickness	Trunk thickness
	2022	2023	2022	2023	2022	2023
Sweet Sapphire	86.25	86.25	5.36	5.37	4.23	4.20
Sweet Celebration	89.25	88.87	4.81	5.00	3.92	3.90
Sweet Globe	89.12	88.62	5.35	5.28	4.37	4.50
Sweet Joy	88.20	87.93	5.20	5.30	4.47	4.56
L.S.D.(0.05)	1.59	N.S	0.24	0.19	0.27	0.26

In this respect, Mohamed and Khaiery (2017) found concerning berry weight and size, the Sable grape and Desert Red grape (black cultivars) were big and the Midnight Beauty grape (black skin) was very big. On the other hand, Ahmed and Abd El-Aziz (2021) showed that there were no significant differences among the Early Sweet grape (white cultivar), Prime grape (white skin) and Starlight grape (pink colour) regarding berry weight and size.

Average cluster weight, cluster length and width, berry length, yield per vine and productivity per feddan:

In both seasons, Sweet Sapphire recorded the considerably greatest average cluster weight, cluster length, berry length, yield per vine, and productivity per feddan. Meanwhile, these characteristics were not remarkably affected by the other cultivars. Besides, cluster width was not significantly affected by the studied cultivars (Tables 10, 13 and 14). These results are in agreement with Pascoal *et al.*, (2022) found that the sweet sapphire cultivar is highly resistant to diseases and pathogens, being an advantage in increasing productivity. Moreover, Gaser *et al* (2023) indicated that the yield and bunch weight were significantly higher in the Midnight Beauty grape (black colour) than Starlight grape (pink skin) and Sugrafourteen grape (red colour).

Berry diameter: In both seasons, Sweet Sapphire had the significantly lowest berry diameter, while there were no significant differences among the remaining cultivars (Table 10). These data go in line with those reported by El-Morsy *et al* (2017) showed that Arra 24 grape cultivar (black colour) had the significantly lowest value in berry diameter. Meanwhile, Ahmed and Abd El-Aziz (2021) observed that starlight (red skin) and prime (white cultivar) grapevines were high berry diameter. Gaser *et al* (2023) cleared that the berry length in the Autumn crisp grape (yellowish green colour) was high significantly than Midnight Beauty grape (black skin).

Berry length/berry diameter ratio (L/D ratio): In both seasons, Sweet Sapphire had the remarkably

greatest L/D ratio. However, the L/D ratio was not influenced by the remaining cultivars (Table 10). The results obtained are in harmony with Gaser *et al* (2023) and Mohamed and Khaiery (2017).

Berry shape: Sweet Sapphire was unusually berries of tubular, an elongated and crispy pulp. Sweet Celebration had oval berries and was very crunchy. Sweet Globe gave large and round berries and was very crispy. Sweet Joy recorded elongated oval and firm flesh (figure 1).

Shot berries: There were no found shot berries for all the tested cultivars.

Seeds: It was absent in all the studied cultivars.

Berries numbers: In both seasons, Sweet Joy gave the significantly highest berries number, whereas Sweet Sapphire recorded the considerably lowest value (Table 12). These results are in line with Essa *et al* (2019) found that the Black Rose grape recorded the highest number of berries followed by the Matrouh Eswed grape while the Ribier grape cultivar (black colour) gave the lowest value.

Berry colour: Fruit skin colour was black in Sweet Sapphire and Sweet Joy. Sweet Celebration observed dark red fruit skin colour. Sweet Globe was yellowish green (figure 1).

Berry adherence strength: In both seasons, berry adherence strength was not considerably influenced by the studied cultivars (Table 13). These results agreed with Sabir *et al* (2021) reported that berry adherence strength for the Alphonse Lavallee grape (black cultivar) and Narince grape (white colour) was just as similar to that of skin rupture force.

Moisture content (%): In the first season, there were no significant differences among the tested cultivars. Meanwhile, in the second season, Sweet Globe had significantly the highest moisture%, whereas this character was not remarkably affected by the other cultivars. The results are in line with Kasnazany *et al* (2023) reported that Superior grape (white colour) had the greatest moisture content (84.22%).

**Table 10: Physical berry characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Berry length(L) 2022	Berry length(L) 2023	Berry diameter(D) 2022	Berry diameter (D) 2023	L/D ratio 2022	L/D ratio 2023
Sweet Sapphire	4.85	4.96	1.91	1.91	2.53	2.59
Sweet Celebration	2.46	2.35	2.11	2.13	1.16	1.09
Sweet Globe	2.33	2.37	2.15	2.10	1.08	1.13
Sweet Joy	2.35	2.30	2.05	2.10	1.14	1.09
L.S.D.(0.05)	0.30	0.14	0.10	0.13	0.15	0.09

**Table 11: Physical berry characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Berry weight 2022	Berry weight 2023	Berry size 2022	Berry size 2023	Weight of 100 berries 2022	Weight of 100 berries 2023
Sweet Sapphire	8.25	8.62	7.78	7.63	825.00	862.00
Sweet Celebration	5.50	5.40	5.00	4.90	550.00	540.00
Sweet Globe	5.56	5.62	4.96	5.05	556.25	562.75
Sweet Joy	5.33	5.21	4.85	4.86	533.75	521.25
L.S.D.(0.05)	0.51	0.33	0.36	0.35	51.07	33.87

**Table 12: Physical berry characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Volume of 100 berries 2022	Volume of 100 berries 2023	Juice volume 2022	Juice volume 2023	Number of berries 2022	Number of berries 2023	Moisture % 2022	Moisture % 2023
Sweet Sapphire	778.75	763.75	725	726	85.75	85.37	82.75	82.70
Sweet Celebration	500.00	490.00	459	460	97.37	97.50	82.75	82.65
Sweet Globe	496.25	505.00	452	453	91.87	92.12	82.75	82.87
Sweet Joy	485.00	486.25	446	447	103.00	102.12	82.85	82.55
L.S.D.(0.05)	36.55	35.91	8.63	8.63	2.06	2.39	N.S	0.16

**Table 13: Physical cluster characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Cluster weight 2022	Cluster weight 2023	Cluster ngth 2022	Cluster length 2023	Cluster width 2022	Cluster width 2023	Berry adherence strength 2022	Berry adherence strength 2023
Sweet Sapphire	707.50	736.25	26.50	26.50	13.25	13.50	462.50	467.50
Sweet Celebration	535.40	526.53	21.12	21.62	12.75	13.62	461.25	466.25
Sweet Globe	511.09	518.32	21.37	21.62	13.62	14.00	458.75	471.25
Sweet Joy	549.75	532.49	22.12	22.12	13.62	13.37	460.00	467.50
L.S.S.(0.05)	44.96	33.35	2.27	1.52	N.S	N.S	N.S	N.S

**Table 14: Clusters number, bud Fertility%, yield and productivity of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	Clusters number 2022	Cluster number 2023	Fertility % 2022	Fertility % 2023	Yield 2022	Yield 2023	Productivity 2022	Productivity 2023
Sweet Sapphire	38.50	39.50	53.00	54.25	18.39	19.13	12.86	13.39
Sweet Celebration	35.50	36.50	48.75	50.25	13.91	13.68	9.73	9.57
Sweet Globe	45.50	46.50	62.75	64.00	13.28	13.47	9.29	9.42
Sweet Joy	30.50	31.50	41.75	43.25	14.28	13.84	9.99	9.68
L.S.D.(0.05)	0.021	0.020	0.39	0.39	1.17	0.86	0.82	0.60

**Table 15: Chemical berry characteristics of Sweet grape cultivars in the 2022 and 2023 seasons**

Character Cultivar	TSS 2022	TSS 2023	Acidity 2022	Acidity 2023	TSS/acidity ratio 2022	TSS/acidity ratio 2023
Sweet Sapphire	17.50	17.75	0.62	0.61	28.13	28.90
Sweet Celebration	19.75	20.00	0.60	0.60	32.66	32.91
Sweet Globe	17.25	17.50	0.61	0.62	28.18	28.12
Sweet Joy	17.25	17.25	0.62	0.61	27.72	28.28
L.S.D.(0.05)	0.54	0.79	N.S	N.S	1.32	1.68



Sweet Sapphire



Sweet Celebration



Sweet Joy



Sweet Globe

**Figure 1: Clusters characteristics of Sweet grape cultivars****Chemical berry characteristics:**

**Total soluble solids (TSS):** Sweet Celebration had a highly considerable TSS as compared with the remaining cultivars in both seasons. On the other hand, there were no significant differences among the other cultivars (Table 15). The results are in line with Gaser *et al* (2023) showed that sugrafourteen grape (red cultivar) had significantly higher TSS than Midnight Beauty (black skin). Meanwhile, El-Morsy *et al* (2017) and Ahmed and Abd El-Aziz (2021) found that there were no significant differences among the different grape cultivars.

**Acidity:** In both seasons, acidity was not remarkably affected by the tested varieties (Table 15). In this respect, Reynolds and Wardre (2001) showed slight significant differences in acidity among nine wine grape cultivars grafted on four different rootstocks over eight years.

**TSS/acidity ratio:** Sweet Celebration had the significantly greatest TSS/acidity ratio in both seasons, while this ratio was not considerably affected by the other cultivars (Table 15). The data obtained agree with many studies for different grape cultivars (Gaser *et al* (2023); El-Morsy *et al* (2017) and Ahmed and Abd El-Aziz (2021).

**REFERENCES**

- A.O.A.C. (2012). Official methods of analysis of AOAC International 19 Ed. Association of Official Analytical Chemists. Gaithersburg, Maryland .U.S.A.
- Ahmed, O. A. and M. H. Abd El-Aziz (2021). Description and evaluation of some newly introduced grape cultivars under Egyptian condition. *J. of Agricultural Chemistry and Biotechnology*. Mansoura, Univ. Vol **12(7)**: 127-136.
- Akkurt, M., H. Tahmaz and S. Veziroglu (2019) Recent developments in seedless grapevine breeding. *S. Afr. J. Enol. Vitis* ., Vol. **40**, No.2.
- Ali, M. A., M. M. El-Mogy and I. A. Rizk (2000). Effect of cane length on bud behaviour, bunch characteristics wood ripening and chemical contents of Thompson Seedless grapevines. *J. Agric. Sci. Mansoura.Unvi*.**25(3)**:1707-1717.
- Baraket, G , K. Chatti, O. Saddoud, A. Abdelkarim, M. Mars, M Trifi, A. Hannachi (2010) Plant molecular biology report, Available: <http://dx.doi.org/10.1007/s11105-010-0217-x>.
- El-Morsy, F. M., A. S. Gaser and M. N. Mohamed (2017). Morphological description and evaluation of six newly-introduced grape cultivars under Egyptian condition. *J. Plant Production Mansoura Univ.*, Vol. **8(11)**: 1059-1070.Essa, M. E, M. A. Wahab, H. H. Aly and H. A. Hussein (2019). A study on the evaluation of some grape cultivars grown in

- reclaimed land.  
Fayoum.J.Agric.Res.Dev.Vol.33.No.1(B).
- Ewada, M. E. A (2008). Improving fruit quality and storability of Thompson Seedless grape by preharvest foliar application substances. Ph.D. Thesis. Alexandria Univ., Alexandria, Egypt.
- Gaser, A. S. T. S. Abo El-Wafa and A. R. Farag (2023). Evaluation and morphological characteristics of some newly introduced grape cultivars under Egyptian environmental conditions. Horticulture Research Journal. 1(1):121-137.
- Gomez, K .A. and A. A. Gomez (1984). Statistical Procedures For Agricultural Research. John Wiley and Sons NY.
- Halasz, G, Veres .A., Kozma .P., Kiss .E, Balogh. A., Galliz., Szoke. A, Hoffman. S and Heszky. L . (2005). Microsatellite fingerprinting of grapevine (*Vitis vinifera* L .) varieties of the Carpathian Basin, *Vitis* 44:173-180.
- Ismail, M. A.(1989). Studies on growth productivity and quality of some grape cultivars. M.Sci. Thesis. Fac. Agric. Cairo. Univ. Egypt.
- Kasnazany, S. A., S. N. Mirza, A. M. Mohamed, S. S. Abd El-rahman, J. S. Hamed and K. B. Nasrulla (2023). A comparison of nine grape cultivars growing in Iraq Kurdistan region in terms of their vegetative growth and physicochemical traits. 4<sup>th</sup> International Agricultural Conference (IAC-2023)
- Keller, M.(2020).The Science of Grapevines.3<sup>rd</sup> Ed., London: Elsevier Academic Press.
- Mohamed, G. A. and A. T. Khaiery (2017). Description and evaluation of Sable, Midnight Beauty and Desert Red grape cultivars under Egyptian conditions. Middle East Journal of Applied.Vol.7(4):1101-1109.
- OIV, (2013) International organization of vine and wine. Statistical report on world Viti-Viniculture.
- Pascoal, G. L. M. S. Cruz, J. P. Abreu, M. C. Santos, G. B. Fanaro, M. M. Junior, O. F. Silva, R. F. Moreira, L. C. Cameron, M. S. Ferreira and J. A. Teodoro (2022) Evaluation of the antioxidant capacity, volatile composition and phenolic content of hybrid *Vitis vinifera* L. Varieties Sweet Sapphire and Sweet Surprise. Food Chemistry . Vol. 366.
- Reynolds, A. G. and D. A. Wardle (2001). Rootstocks impact vine performance and fruit composition of grapes in British Columbia. Hort. Technol., 11: 419-427.
- Sabir, F.K., A. Sabir and S. Unal (2021). Maintaining the grape quality on organically grown vines (*Vitis vinifera* L) at vineyard conditions under the temperate climate of Konya province. Erwerbs-Obstbau. Vol 63: 71-76.
- Sabry, G. H. M. S. Rizk-Alla and S. Y. Mohamed (2009). Horticultural and molecular genetic characterization of some grape cultivars under desert land conditions. J. Bio. Chem. Environ. Sci. 4(1): 519-544.
- SAS(2002). SAS/STAT. Guide for personal computers. Version 9.1 ed. SAS end SAS institute, Cary N.C., USA.
- Silva, N.B.(2017). Desenvolvimento da uva passa da cultivar Sweet Sapphire proventiente do vale do sao Francisco co-PE Marjorie castro pinto portfirio. PE. 120f. Dissertacao (Programa de pos-Graduacao em Cienciae Tecnologia de Alimentos)-Universidade Federal Rural de Pernambuco, Recife.

### الملخص العربي

## توصيف وتقييم بعض اصناف عنب سويت الجديدة تحت الظروف المصرية

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اجريت هذه الدراسة خلال موسمين ناجحين 2022 و2023 على شجيرات عمر 5 سنوات لتقييم بعض اصناف عنب سويت الجديدة في مزرعة الروضة-منطقة النوبارية- محافظة البحيرة وهي اصناف سويت سافير وسويت سلبيريشن وسويت جلوب وسويت جوى المطعومة على اصل بولسن 1103 والنامية في ارض جيرية. النتائج اظهرت في كلا الموسمين ان صنف سويت سلبيريشن اقل معنويا في مساحة الورقة عن بقية الاصناف بينما لا يوجد فروق معنوية بين بقية الاصناف. في الموسم الاول صنف سويت سلبيريشن اعلى معنويا في طول السلامة عن صنفى سويت جلوب وسويت سافير. في الموسم الاول صنفى سويت جلوب وسويت سافير اعلى معنويا في سمك السلامة عن

صنف سويت سلبيريشن. فى الموسم الاول صنفى سويت سافير وسويت جلوب اعلى معنويا فى عدد السلاميات عن صنفى سويت جوى وسويت سلبيريشن. فى الموسم الاول صنف سويت سافير اقصر معنويا فى طول القصبه عن بقية الاصناف. فى كلا الموسمين صنف سويت سلبيريشن اقل معنويا فى وزن خشب التقليم عن بقية الاصناف. فى كلا الموسمين صنفى سويت جوى وسويت جلوب اعلى المعنوية فى سمك الجذع مقارنة بصنف سويت سلبيريشن. صنف سويت جلوب الاعلى معنويا فى عدد العناقيد ونسبة خصوبة البراعم فى كلا الموسمين. صنف سويت سافير الاعلى معنويا فى وزن الحبة وحجم الحبة ووزن 100 حبة وحجم 100 حبة وحجم العصير فى كلا الموسمين. بالاضافة فى كلا الموسمين صنف سويت سافير الاعلى معنويا فى متوسط وزن العنقود وطول العنقود وطول الحبة والمحصول لكل شجرة والانتاجية للفدان. ايضا فى كلا الموسمين سويت سافير الاعلى معنويا فى نسبة طول الحبة الى قطر الحبة بينما فى كلا الموسمين سويت سافير الاقل معنويا فى قطر الحبة وفى نفس الوقت لا يوجد فروق معنوية بين بقية الاصناف. صنف سويت جوى اعطى الاعلى معنويا فى عدد الحبات بينما سويت سافير سجل الاقل معنويا. فيما يتعلق بشكل الحبة ولون الحبة: حبات صنف سويت سافير غير عادية وانبوبية مستطيلة ومقرمشة وذات جلد اسود. حبات صنف سويت سلبيريشن بيضاوية ومقرمشة جدا ولونها احمر غامق. حبات صنف سويت جلوب كبيرة ومستديرة ومقرمشة جدا وذات لون اخضر مصفر. حبات صنف سويت جوى بيضاوية ممدودة ومتماسك اللحم واسود اللون. لا يوجد بذور ولا حبات صغيرة فى كل الاصناف المدروسة. فى كلا الموسمين قوة شد الحبات لم تتاثر معنويا بكل الاصناف المدروسة. صنف سويت جلوب الاعلى معنويا فى نسبة الرطوبة فى الحبات فى الموسم الثانى فقط. كل الاصناف تعتبر متوسطة النضج. صنف سويت سلبيريشن كان اعلى المعنوية فى نسبة المواد الصلبة الذائبة ونسبة المواد الصلبة الذائبة الى الحموضة فى كلا الموسمين. الحموضة لم تتاثر معنويا بالاصناف المختبرة فى كلا الموسمين. نحن نوصى بزراعة صنف عنب سويت سافير فى منطقة النوبارية لان هو الاعلى محصول وذو جودة ثمار عالية.