Comparative study among some Egyptian Galia F1 Hybrids with Commercial Hybrids under Different Potassium Supplement strategies

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ABSTRACT

Cantaloupe is one of the most demanding cucurbits regarding fertilization, crop nutritional requirements, time of application, and nutrient use efficiency for proper fertilization. The current study is aiming to compare two among some Egyptian Galia F1 Hybrids "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" with commercial Hybrids (Primal, Ideal, KMA 104 and Fado) under different Potassium Supplement strategies (during flowering and fruiting period) and its effect on productivity and fruit quality. Drip irrigation method was used and potassium fertilizer rates treatments were 100, 140 and 180 kg/fed. as potassium sulfate where the recommended dose of potassium (100 kg/fed.) was added weekly with fertilization during vegetative growth stage, meanwhile, 140 and 180 kg/fed. treatments were applied by added 40 and 80 kg/fed. during flowering and fruit set statues. The results showed that all studied fruits quality parameters (average fruit weight, length, diameter, fruit shape index flesh weight of fruit) as well as fruit yield and its components (Early fruit yield / plant, total fruit No. /plant, total fruit yield / plant and total fruit yield / Fed) were positively affected by increasing potassium fertilizer rates from 100 to 180 kg/fed.. Also, All studied fruits quality parameters were significantly affected by Egyptian Galia F1 "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with comercial cultivares (Primal, Ideal, KMA 104 and Fado). Where, GH0913 (GW x Hira4, Egyptian Galia F1) and Primal (Comercial F1) followed by Ideal (Comercial F1) recorded the highest values of average fruit weight, length, diameter parameters. Fado (Technogreen), KMA 104 and Primal cv recorded the highest values of early fruit yield /fed. in both seasons. Meanwhile, the highest values of total fruit yield / plant or Fed. were recorded with comercial cultivare (Primal) and Egyptian Galia F1 "GH0913 (GW x Hira4). It can be concluded from this study that it's important to choose the proper combinations of cultivares and potassium rates to rich the largest advantage of their interactions for cantaloupe plant production. This study revealed that the best combination of treatments gave the best results for cantaloupe production and quality of fruits is comercial cultivare (Primal) and Egyptian Galia F1 "GH0913 (GW x Hira4) with increasing potassium levels in the nutrient solution upto 180 kg during flowering and fruit set statues.

Keywords: Cucumis melo, Cantaloupe; potassium; flowering; fruiting period and cultivars.

Introduction

Cantaloupe (Cucumis melo L.) is one of the most important and popular fruity vegetables grown in many countries including Egypt. Cantaloupe is an excellent source of vitamins, as well as carbohydrates and minerals (especially potassium). Also, it is rich in antioxidiant compounds. These antioxidants have the ability to protect body cells against cancer. In addition, it is low in fat and calories (about 17 kcal/100g) (Shafeek et al., 2015). According to statistics of Ministry of Agric, Egypt, 2018/2019, the cultivated area of cantaloupe in Egypt is 15,412 feddan with total production of 171,927 tons and an average of 11.155 ton per fed.

Fertilization significantly affects the yield and quality of Cantaloupe (Cucumis melo L.). Potassium is as the essential plant nutrient and has the great influence on many quality parameters of vegetables fruits (Beringer et al., 1986). Adequate nutrition of K is associated with increased yields, fruit size, increased soluble solids and ascorbic acid concentrations, improved fruit color, increased shelf life, and shipping quality of many horticultural crops, while insufficient or excessive potassium...
level adversely affects fruit quality (Asri and Sonmez, 2010; Lester et al., 2006 and Lester et al., 2010). Therefore, during reproductive development, the soil potassium supply must be adequate to support crucial processes such as sugar transport from leaves to fruit, enzyme activation, protein synthesis, and cell extension that ultimately determine fruit yield and quality (Lester et al., 2005).

The aim of this study is comparing two Egyptian Galia F1 hybrids with commercial hybrids under different potassium supplement strategies during flowering and fruiting period and its effect on productivity and fruit quality.

Material and Methods

The present work was carried out in a private farm, Kalyobiya Governorate, Egypt during 2019 and 2020 summer seasons to study the response of two Egyptian Galia F1 Hybrids "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" comparing with commercial Hybrids (Primal, Ideal, KMA 104 and Fado) to three different potassium fertilizer rates during flowering and fruiting period and its effect on productivity and fruit quality.

Cantaloupe cultivars from different sources were used. Primal and Ideal cultivars were obtained from Syngenta Company; KMA 104 cultivar was obtained from Taki Company and Fado cultivar was obtained from Samtrade Company. Meanwhile, the local hybrids GH0913 (GW x Hira4) and GK0911 (GW X Kyouli) were obtained from the national campaign to produce vegetable seeds, National Research Centre. The date of seedlings planted in the field was on 3th of Feb. in 2019 and 2020 seasons. Experimental soil was clay soil in texture with pH of 7.14 and EC of 1.70 dS/m. The physical and chemical properties of the soil under study are shown in Table 1.

| Table 1: Physical and chemical properties of experimental soil as average of both seasons 2019 and 2020. |
|---|---|---|---|---|
| **Mechanical** | **Textural class** | **pH** | **E.f: Soil paste 1:1 ds/m** | **Organic matter** |
| Sand | Silt | Clay | (1-2.5 Soil : water suspension) |
| 16.8% | 22.9% | 54.7% | 7.14 | 1.7 | 2.2% |

| **Soluble Anions and Cations** |
|---|---|---|---|---|---|---|
| **Anions (meq./L)** | **Cations (meq./L)** |
| CO₃⁻ | HCO₃⁻ | Cl⁻ | SO₄⁻ | Ca²⁺ | Mg²⁺ | Na⁺ | K⁺ |
| 0.00 | 5.42 | 1.70 | 4.6 | 4.30 | 5.10 | 1.30 | 1.70 |

| **Available macro and micro elements (mg/kg)** |
|---|---|---|---|---|---|---|
| N | P | K | Fe | Mn | Zn | Cu |
| 400 | 9.9 | 506.6 | 5.3 | 1.4 | 3.6 | 4.6 |

The plants were irrigated by drip irrigation system. Potassium was fertilized with rates 100, 140 and 180 kg/fed. as potassium sulfate where the recommended dose of potassium (100 kg/fed.) was added weekly with fertilization during vegetative growth stage, meanwhile, 140 and 180 kg/fed. treatments were applied by additional application of 40 and 80 kg/fed. during flowering and fruit set stages.

Two-factorial experiment was conducted a split-plot design, with three replicates. Different cultivars were distributed in the main plot, while, potassium fertilizer rates were assigned to the sub-plot. Each plot included 16 plants, with space of 50 cm between hills within the row where, the area of each plot was 12 m² (8 m length × 1.50 m width). The normal cultural practices needed for growing melon plants, i.e. N and P fertilization and pest control were practiced as commonly required.

Yield of the first three pickings was considered as early yield as well as number of fruits per plant and total yield per feddan were calculated in the end of the growing season. Fruit shape index was calculated by fruit length/fruit diameter. Average fruit weight (g), flesh thickness of fruit (cm) and seed cavity diameter (cm) as well as total soluble solids percentage (A.O.A.C., 1990) were measured. Data were subjected to the statistical analysis by the method of Duncan’s multiple range tests as reported by Gomez and Gomez (1984). Statistical analysis was performed with SAS computer software.
Results

1. Effect of potassium fertilizer rates, different melon cultivars and their interaction on physical quality of cantaloupe fruits

Data presented in Tables 1 and 2 show effects of potassium rates and different melon cultivars on average fruit weight, length, diameter and shape index as well as flesh diameter, seed cavity diameter, TSS and flesh weight during 2019 and 2020 seasons. All fruit quality parameters, i.e., average fruit weight, diameter and flesh and diameter and TSS except seed cavity diameter were significantly affected by various trials of the potassium fertilization. However, increasing potassium levels in the nutrient solution significantly affected all studied fruits quality parameters.

Current fruit quality parameters also were significantly affected by the Egyptian Galia F1 "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with commercial cultivars (Primal, Ideal, KMA 104 and Fado). Where, GH0913 (GW x Hira4, Egyptian Galia F1) ranked the first and Primal (Comerical F1) ranked the second followed by Ideal (Comerical F1) regarding to values of average fruit weight, length, diameter parameters (Table, 1). Concerning fruit shape index parameter, there is variations among all different cultivars in both seasons also. Whereas, cv. Ideal and GH0913 (GW x Hira4, Egyptian Galia F1) followed by Primal (Comerical F1) recorded higher significant fruit shape index as compared with other cultivars in first season while in the second season, cv. Ideal is superior on other cultivars. In general, Egyptian Galia F1 "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" and commercial cultivars (Primal and Ideal) fruits were more rounded than the other cultivars (Table, 1). Ideal and Primal F1, then GK0911 (GW X Kyouli) "Egyptian Galia F1" had the biggest flesh thickness than those of other cultivars, while GH0913 (GW x Hira4) Egyptian Galia F1 followed by commercial cultivars (Primal and Ideal) had the biggest seed cavity diameter (Table, 2).

Significant effect was found among all studied cultivars "Egyptian Galia F1, "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with commercial cultivars (Primal, Ideal, KMA 104 and Fado) on total soluble solids in first season. Even so, fruits of Fado "commercial cultivars" followed by GH0913 (GW x Hira4) "Egyptian Galia F1" recorded higher values than those of other cultivars (Table, 2).

Regarding the effect of potassium rates X cultivars, data in Tables indicate that the average fruit weight, fruit diameter, fruit length and fruit shape index as well as flesh diameter, seed cavity diameter, TSS and flesh weight were affected by this interaction in both seasons. Even so, the highest values of average fruit weight, fruit diameter and fruit length were indicated when GH0913 (GW x Hira4, Egyptian Galia F1) and Primal (Commercial F1) fertigated by high potassium level (180 kg) in the nutrient solution in both seasons. When Ideal, GH0913, Fado (Samtrade) and GH0913 fertigated by high potassium level (180 kg) in the nutrient solution, they recorded the highest values of flesh diameter, seed cavity diameter, TSS and flesh weight, respectively in first season. In second season, Primal, GH0913 (GW x Hira4), KMA 104 and Primal had the highest values, respectively on flesh diameter, seed cavity diameter, TSS and flesh weight.

These results are in agreement with (Demiral and Koseoglu, (2005); Frizzone et al., (2007); Tang et al., (2012) and Asao et al., (2013) and Santos et al., (2018) on melon, they found that the highest values of fruit diameter and fruit length were obtained with the highest potassium application levels.

2. Effect of potassium fertilizer rates, different melon cultivars and their interaction on fruit yield and its components of cantaloupe plants

Data presented in Table 3 show effect of potassium rates and Egyptian Galia F1 "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with commercial cultivars (Primal, Ideal, KMA 104 and Fado) on Early yield/ Fed. Total fruit No. /plant., total fruit yield / plant, total fruit yield / Fed. during 2019 and 2020 seasons.

Increasing potassium levels in the nutrient solution significantly affected all fruit yield and its components (Early yield/ Fed, total fruit No. /plant, total fruit yield / plant, Total fruit yield / Fed.).

All studied fruit yield and its components parameters were significantly affected by the Egyptian Galia F1, "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with commercial cultivars (Primal, Ideal, KMA 104 and Fado). Where, Fado (Technogreen), KMA 104 and Primal cv recorded the highest values of early fruit yield /Fed in both season. Meanwhile, the highest values of
Table 1: Effect of potassium rates, Egyptian Galia F1 hybrids comparing with commercial cultivars and their interaction on average fruit weight, length, diameter and shape index during 2019 and 2020 seasons.

| Treatments | Season 2019 | Season 2020 |
|------------|-------------|-------------|
|            | Fruit Weight | Fruit Length | Fruit Diameter | Fruit Shape Index | Fruit Weight | Fruit Length | Fruit Diameter | Fruit Shape Index |
| GH0913 (GW x Hira4) Egyptian Galia F1 Potassium rates | 691a | 10.1a | 10.1a | 1.00a | 734a | 9.6b | 10.7a | 0.89d |
| GK0911 (GW X Kyouli) Egyptian Galia F1 | 421c | 8.8b | 9.5b | 0.93b | 450c | 9.7b | 8.6b | 1.13b |
| Primal (Syngenta) | 649ab | 10.1a | 10.1a | 0.99ab | 627ab | 9.9b | 10.3a | 0.96cd |
| Ideal (Syngenta) | 556b | 10.1a | 9.8ab | 1.04a | 612b | 10.9a | 9.1b | 1.21a |
| Fado (Samtrade) | 331cd | 8.3bc | 8.5c | 0.98ab | 314d | 8.0b | 8.8b | 0.90d |
| KMA 104 (Taki) | 272d | 7.7c | 7.7d | 0.99ab | 302d | 7.8c | 7.7c | 1.01c |

| Cultivars | Season 2019 | Season 2020 |
|-----------|-------------|-------------|
|            | Fruit Weight | Fruit Length | Fruit Diameter | Fruit Shape Index | Fruit Weight | Fruit Length | Fruit Diameter | Fruit Shape Index |
| GH0913 (GW x Hira4) Egyptian Galia F1 Potassium rates | 100 kg | 657ab | 9.8ab | 10.0a | 703ab | 9.4c | 10.4ab | 0.91f |
|            | 140 kg | 697a | 9.9ab | 10.0a | 745a | 9.3d | 10.6a | 0.88g |
|            | 180 kg | 718a | 10.6a | 10.4a | 754a | 9.9b | 11.0a | 0.90f |
| GK0911 (GW X Kyouli) Egyptian Galia F1 | 100 kg | 335d-f | 7.7cd | 9.6ab | 358b-f | 8.5e | 8.7de | 0.98def |
|            | 140 kg | 421c-e | 8.8bc | 9.5a-c | 450cde | 9.7b-e | 8.6de | 1.12bc |
|            | 180 kg | 506-d | 9.9ab | 9.4a-c | 542b-d | 10.9ab | 8.5d-f | 1.27a |
| Primal (Syngenta) | 100 kg | 573ac | 9.9ab | 9.9a | 561a-c | 9.8b-c | 10.0a-c | 0.98d-f |
|            | 140 kg | 680ab | 10.1a | 10.1a | 659ab | 9.8b-e | 10.4ab | 0.96d-g |
|            | 180 kg | 693a | 10.2a | 10.3a | 660ab | 10.1bd | 10.4ab | 0.93e-g |
| Ideal (Syngenta) | 100 kg | 538ac-c | 9.9ab | 9.6ab | 602a-c | 10.6a-d | 9.0c-e | 1.18ab |
|            | 140 kg | 563ac-c | 9.8ab | 9.5a-c | 620a-c | 11.4a | 9.5b-d | 1.20ab |
|            | 180 kg | 568ac-c | 10.7a | 10.2a | 614a-c | 10.8ab | 8.7de | 1.24a |
| Fado (Samtrade) | 100 kg | 313ef | 8.2cd | 8.2de | 300ef | 7.8gh | 8.6de | 0.90fg |
|            | 140 kg | 338d-f | 8.4c | 8.7b-d | 321ef | 7.9g | 8.9de | 0.90fg |
|            | 180 kg | 342d-f | 8.4c | 8.5cd | 321ef | 8.1f-h | 9.0c-e | 0.89fg |
| KMA 104 (Taki) | 100 kg | 223f | 7.0d | 7.2c | 246f | 7.0h | 7.1g | 1.05cd |
|            | 140 kg | 270ef | 7.8cd | 7.7de | 297ef | 7.9gh | 7.5fg | 0.97d-g |
|            | 180 kg | 323ef | 8.3c | 8.3d | 362b-f | 8.4f-g | 8.3ef | 1.01de |
Table 2: Effect of potassium rates, Egyptian Galia F1 hybrids comparing with commercial cultivars and their interaction on Flesh diameter, Seed cavity diameter, TSS and Flesh weight of fruits during 2019 and 2020 seasons.

| Cultivars                              | Treatments Potential rates | Season 2019 | Season 2020 |
|----------------------------------------|-----------------------------|-------------|-------------|
|                                        | Potassium rate              | Flesh diameter | Seed cavity diameter | TSS | Flesh weight |又| Seed cavity diameter | TSS | Flesh weight |
| GH0913(GW x Hira4) Egyptian Galia F1  | 100 kg                      | 2.53c-f      | 7.47a        | 10.67c       | 573.98ab | 2.37de       | 8.27a        | 11.95cd       | 536.43a-c    |
|                                        | 140 kg                      | 2.73a-e      | 7.47a        | 11.60bc      | 591.30ab | 2.55b-d      | 8.27a        | 11.63d        | 552.62a-c    |
|                                        | 180 kg                      | 2.90c-a      | 7.27a        | 12.17a-c     | 637.60a  | 2.76bd       | 7.86ab       | 13.26a-d      | 607.24a      |
| GK0911(GW X Kyouli) Egyptian Galia F1 | 100 kg                      | 2.57c-f      | 6.87a-c      | 11.23bc      | 294.43d-f| 2.40de       | 6.18g        | 11.90c-d      | 275.17e-g    |
|                                        | 140 kg                      | 2.65f-b      | 6.85a-c      | 11.90bc      | 367.14e-c| 2.48cd       | 6.16g-e      | 13.05a-d      | 343.12d-f    |
|                                        | 180 kg                      | 2.73a-e      | 6.83a-c      | 12.57a-c     | 439.84b-d| 2.55b-d      | 6.15g-e      | 13.79a-d      | 411.07e-c    |
| Primal (Syngenta)                     | 100 kg                      | 2.73c-e      | 7.17a-b      | 12.13a-c     | 482.13a-c| 2.79bd       | 7.07b-e      | 13.35a-d      | 491.97a-c    |
|                                        | 140 kg                      | 2.97c-c      | 7.13ab       | 13.30ab      | 569.70ab | 3.06ab       | 7.21bc-d     | 13.46a-d      | 587.32ab     |
|                                        | 180 kg                      | 3.20a-b      | 7.17ab       | 13.60ab      | 589.70ab | 3.37a        | 7.39a-c      | 14.63ab       | 620.74a      |
| Ideal (Syngenta)                      | 100 kg                      | 2.83c-c      | 6.93a-c      | 11.80bc      | 463.45b  | 2.56b-d      | 6.44c-f      | 12.96a-d      | 413.80e-c    |
|                                        | 140 kg                      | 2.87a-c      | 6.77a-c      | 13.17ab      | 498.22a-c| 2.60b        | 6.54c-f      | 13.77a-d      | 456.66bc     |
|                                        | 180 kg                      | 3.27a        | 6.70a-c      | 13.00a-c     | 631.67a  | 2.99a-c      | 6.08g-e      | 14.46a-c      | 578.98ab     |
| Fado (Samtrade)                       | 100 kg                      | 2.43c-f      | 6.03cd       | 12.83a-c     | 274.39ef | 2.91a-d      | 5.92g        | 12.58bd       | 285.83eg     |
|                                        | 140 kg                      | 2.57f-c      | 5.60c-d      | 13.00a-c     | 295.36d-e| 2.67b-d      | 6.09g-e      | 12.74bd       | 310.90d-g    |
|                                        | 180 kg                      | 2.77d-d      | 5.97c-e      | 14.43a       | 298.17f-d| 2.59b-d      | 6.32f-e      | 14.29a-c      | 317.20d-g    |
| KMA 104(Taki)                         | 100 kg                      | 2.07f         | 6.17a-d      | 12.17a-c     | 197.91f  | 1.88e        | 5.67f-g      | 12.51bd       | 179.92g      |
|                                        | 140 kg                      | 2.13c-f      | 5.03e        | 13.60ab      | 236.40ef | 1.94e        | 5.21g        | 13.75a-d      | 214.91f-g    |
|                                        | 180 kg                      | 2.17d-f      | 5.63de       | 13.17ab      | 274.61ef | 1.93e        | 6.37d-f      | 15.37a        | 245.19f-g    |
Table 3: Effect of potassium rates, Egyptian Galia F₁ hybrids comparing with commercial cultivars and their interaction on fruit yield and its component during 2019 and 2020 seasons.

| Cultivars                        | Treatments | Season 2019 | Season 2020 |
|----------------------------------|------------|-------------|-------------|
|                                  | Potassium rates | Early yield/ Fed. | Total fruit No. / Plant | Total fruit yield / Plant | Total fruit yield / Fed. | Early yield/ Fed. | Total fruit No. / Plant | Total fruit yield / Plant | Total fruit yield / Fed. |
| GH0913 (GW x Hira4) Egyptian Galia F₁ | 100 kg     | 352e 4.3bc | 2984a 17.907a | 402e 4.4b | 3203a 19.218a |
| GK0911 (GW X Kyouli) Egyptian Galia F₁ | 140 kg     | 1084d 4.1c | 1734c 10.404c | 1174d 4.4b | 2005b 12.030bc |
| Primal (Syngenta)                | 180 kg     | 124f 4.7a | 3038a 18.228a | 201f 5.0a | 3154a 18.927a |
| Ideal (Syngenta)                 | 100 kg     | 1504c 4.3bc | 2400b 14.402b | 1584c 4.1b | 2528b 15.169b |
| Fado (Samtrade)                  | 140 kg     | 3396a 4.6a | 1518c 9.108c | 3473a 4.1b | 1278d 7.670d |
| KMA 104 (Taki)                   | 180 kg     | 2440b 4.8a | 1303c 7.817c | 2520b 4.9a | 1534cd 9.206cd |
|                                  | 100 kg     | 528c 4.1b | 1800c 10.800c | 604c 3.9c | 1830c 10.978c |
|                                  | 140 kg     | 1576b 4.5a | 2192b 13.150b | 1652b 4.4b | 2265b 13.587b |
|                                  | 180 kg     | 2346a 4.8a | 2497a 14.983a | 2422a 5.1a | 2757a 16.545a |

The interaction

| Cultivars                        | Treatments | Season 2019 | Season 2020 |
|----------------------------------|------------|-------------|-------------|
| GH0913 (GW x Hira4) Egyptian Galia F₁ | 100 kg     | 0i 4.0b | 2627b-e 15.760b-e | 50i 4.0de | 2811b-e 16.863b-e |
| GK0911 (GW X Kyouli) Egyptian Galia F₁ | 140 kg     | 540h 4.3ab | 2983a-d 17.900a-d | 590h 4.5b-d | 3304a-c 19.824a-c |
| Primal (Syngenta)                | 180 kg     | 516 4.7ab | 3343ab 20.060ab | 566h 4.7b-d | 3495ab 20.969ab |
|                                  | 100 kg     | 0i 4.0b | 1339j 8.035j | 90i 4.0de | 1433f-h 8.597f-h |
|                                  | 140 kg     | 1260fg 4.0b | 1682g-j 10.094f-j | 1350fg 4.3b-e | 1948e-g 11.688e-g |
|                                  | 180 kg     | 1992d 4.3ab | 2180d-h 13.082d-h | 2082d 4.9bc | 2634b-e 15.806c-e |
| Fado (Samtrade)                  | 100 kg     | 0i 4.3ab | 2495c-f 14.967c-f | 77i 4.3b-e | 2421c-e 14.529c-e |
|                                  | 140 kg     | 372hi 4.6ab | 3125abc 18.751a-c | 449hi 4.7b-d | 3084a-d 18.505a-d |
|                                  | 180 kg     | 0i 5.0a | 3494a 20.966a | 77i 6.0a | 3958a 23.746a |
| Ideal (Syngenta)                 | 100 kg     | 1560cf 4.0b | 2151f-i 12.906e-g | 1640ef 3.6e | 2200d-f 13.198d-f |
|                                  | 140 kg     | 1680de 4.3ab | 2407c-g 14.439d-g | 1760de 4.0de | 2480c-e 14.881c-e |
|                                  | 180 kg     | 1272fg 4.7ab | 2643b-e 15.860b-e | 1352fg 4.7b-d | 2905b-d 17.428b-d |
| KMA 104 (Taki)                   | 100 kg     | 576h 4.0b | 1251i 7.506j | 653h 4.0de | 1201g 7.206g-h |
|                                  | 140 kg     | 2748c 4.7ab | 1595b-j 9.573h-j | 2825c 4.0de | 1284f-h 7.705f-h |
|                                  | 180 kg     | 6864a 5.0a | 1708f-j 10.245f-j | 6941a 4.2c-e | 1350f-h 8.099f-h |
|                                  | 100 kg     | 1032g 4.3ab | 937 5.624j | 1112g 3.7c | 913h 5.477h |
|                                  | 140 kg     | 2856c 5.0a | 1357h-j 8.141hj | 2936c 5.0b | 1487f-h 8.920f-h |
|                                  | 180 kg     | 3432b 5.0a | 1614g-j 9.686g-j | 3512b 6.1a | 2204d-f 13.222d-f |
total fruit yield / plant and / Fed. were recorded with commercial cultivar (Primal) and Egyptian Galia F$_1$ "GH0913 (GW x Hira4)."

Concerning the effect of potassium rates X cultivars, Fado (Technogreen), KMA 104 and Primal cv recorded the highest values of early fruit yield /Fed. with increasing potassium levels in the nutrient solution in both season. Meanwhile, the highest values of total fruit yield / plant or /Fed. were recorded with commercial cultivar (Primal) and Egyptian Galia F$_1$ "GH0913 (GW x Hira4) with increasing potassium levels in the nutrient solution.

These results are in agreement with Demiral and Koseoglu (2005), Frizzone et al., (2005), Kaya et al., (2007), Ana et al., (2012), Tang et al., (2012), Asao et al., (2013), Merghany et al., (2015) and Santos et al., (2018) on melon, they found that the highest values of fruit diameter, fruit length, number of fruits per plant and number of fruit per feddan were obtained with the highest potassium application levels. Also, Santos et al., (2013) reported that the fertilization utilizing potassium chloride significantly increases melon yield.

General trend of comparative between Egyptian Galia F$_1$ hybrids "GH0913 (GW x Hira4) with commercial hybrids " Primal " under different potassium rates on total fruit yield / Fed., fruit weight, flesh diameter, TSS and flesh weigh as average between both seasons are shown in Fig. 1

![Fig. 1: General trend of comparative between Egyptian Galia F$_1$ hybrids "GH0913 (GW x Hira4) with commercial hybrids " Primal " under different potassium rates on total fruit yield / Fed., fruit weight, flesh diameter, TSS and flesh weigh as average between both seasons](image)

**Discussion**

Increasing potassium levels in the nutrient solution showed the highest significant positive effects on physical quality of cantaloupe fruits and fruit yield and its components. These results were expected because K plays a vital role in the increase the size of the fruits. There is an increase in demand for K during the plant’s production process; so, when the melon plants of this experiment received enough K, the efficiency of water was improved by increasing osmotic pressure of cells, making them more expansion and increasing the weight and size of fruits. The obtained results may be due to the function of increasing the vegetative growth, photosynthetic activity, dry matter accumulation and K uptake (Abou El-Magd, 1979). Potassium is not only a constituent of plant structure, but it also has a regulatory function in several biochemical processes related to protein synthesis, carbohydrate metabolism, and enzyme activation. Several physiological processes depend on K, such as stomatal regulation and
photosynthesis. Potassium has important effects on the formation and transportation of carbohydrates, transformation of amino acids to proteins, root growth, maturity and several quality parameters. The beneficial effects of K supplement to the plant were presumably result of a combination of an improvement in the assimilation of CO\(_2\), higher photosynthetic activity and greatest translocation of photoassimilates from leaves to fruits, improved water relations, greater enzyme activity and substrate availability for the biosynthesis of bioactive compounds; so the amount of antioxidants of a plant is also a good indicator of stress tolerance (Kusvuran et al., 2012). So, when the amount of available potassium is sufficient in the soil, the yield and quality increase (Mirza et al., 2018).

It is noticeable that the local Egyptian Galia F1 "GH0913 (GW x Hira4) was the most suitable comparing with the commercial cultivars (Primal, Ideal and Fado). This may be due to the fact that the Egyptian weather conditions are suitable for its vegetative growth, which reflected a significant increase in dry matter contents and consequently total fruit yield.

Conclusions
In this study, the yield and some quality parameters of cantaloupe increased depending on the application of an adequate K fertilizer with irrigation system (Fertigation). Since potassium is important in the fertilization of cantaloupe, its benefits should be considered. The relations between K and yield, K and quality and K and plant health should not be forgotten and K fertilization should be made in soils poor in K.

The cultivars effects were significant and clear. This proves the necessity to make the right choice by selecting the proper genotype according to the prevailing growing conditions. This is support to select Egyptian Galia F1 "GH0913 (GW x Hira4). Where, Egyptian environmental conditions are suitable for its growth and produced highest total yield without any negative effects on fruit quality comparison with other commercial cultivars which are expensive cultivars because it is imported from abroad.

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