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Comparative study among some Egyptian Galia F_1 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 F_1 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 fertiligation 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 statges. 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 compnents (Early fruit yield / plant, total fruit No. /plant, total fruit yield / plant and total fruit yield / Fed) were positively affected by increasind potassium fertilizer rates from 100 to 180 kg/fed.. Also, All studied fruits quality parameters were significantly affected by Egyptian Galia F_1 "GH0913 (GW x Hira4) and GK0911 (GW X Kyouli)" in comparison with comerical cultivares (Primal, Ideal, KMA 104 and Fado). Where, GH0913 (GW x Hira4, Egyptian Galia F1) and Primal (Comerical F_1) followed by Ideal (Comerical F_1) 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 comerical cultivare (Primal) and Egyptian Galia F_1 "GH0913 (GW x Hira4). It can be concluded from this study that it's important to choose the proper combinations of cultivares and putassium 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 comerical cultivare (Primal) and Egyptian Galia F_1 "GH0913 (GW x Hira4) with increasing potassium levels in the nutrient solution upto 180 kg during during flowering and fruit set statges.

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 antioxidant 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

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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 F_1 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 summery seasons to study the response of two Egyptian Galia F_1 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 cultivare was obtained from Taki Company and Fado cultivar was obtained from Samtrade Company. Meanwhile, the local hyprids 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 (1-2.5 Soil : water suspension)**	**Ec: Soil paste 1:1 ds/m**		**Organic matter**
Sand	**Silt**	**Clay**					
16.8%	22.9%	54.7%	Clay	7.14	1.7		2.2%
Soluble Anions and Cations							
Anions (meq./L)				**Cations (meq./L)**			
CO_3^{--}	**HCO_3^{--}**	**Cl^-**	**SO_4^{--}**	**Ca^{++}**	**Mg^{++}**	**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 m^2 (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 cultivares 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 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 F_1 "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 F_1) ranked the second followed by Ideal (Comerical F_1) 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 F_1) 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 F_1 "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 F_1 "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 F_1) 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.,* (2005); Kaya *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 cultivares 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 F_1 "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 F_1 "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 F_1 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			
Cultivars	**Potassium rates**	**Fruit Weight**	**Fruit length**	**Fruit diameter**	**Fruit Shap index**	**Fruit Weight**	**Fruit length**	**Fruit diameter**	**Fruit Shap index**
GH0913 (GW x Hira4) Egyptian Galia F1		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
	100 kg	440b	8.8b	9.1b	0.97b	462b	8.9b	9.0a	1.00b
	140 kg	495a	9.1b	9.3ab	0.99b	515ab	9.4a	9.3a	1.01b
	180 kg	525a	9.7a	9.5a	1.02a	542a	9.7a	9.3a	1.04a
The interaction									
	100 kg	657ab	9.8ab	10.0a	0.98ab	703ab	9.4c-f	10.4ab	0.91fg
GH0913(GW x Hira4) Egyptian Galia F1	**140 kg**	697a	9.9ab	10.0a	0.99ab	745a	9.3d-f	10.6a	0.88g
	180 kg	718a	10.6a	10.4a	1.02ab	754a	9.9b-c	11.0a	0.90fg
	100 kg	335d-f	7.7cd	9.6ab	0.81c	358b-f	8.5e-g	8.7de	0.98def
GK0911(GW X Kyouli) Egyptian Galia F1	**140 kg**	421c-e	8.8bc	9.5a-c	0.93b	450cde	9.7b-e	8.6de	1.12bc
	180 kg	506b-d	9.9ab	9.4a-c	1.05a	542b-d	10.9ab	8.5d-f	1.27a
	100 kg	573ac	9.9ab	9.9a	1.00ab	561a-c	9.8b-c	10.0a-c	0.98d-f
Primal (Syngenta)	**140 kg**	680ab	10.1ab	10.1a	0.99ab	659ab	9.8b-e	10.4ab	0.96d-g
	180 kg	693a	10.2a	10.3a	0.98ab	660ab	10.1bd	10.4ab	0.93e-g
	100 kg	538a-c	9.9ab	9.6ab	1.03a	602a-c	10.6a-d	9.0c-e	1.18ab
Ideal (Syngenta)	**140 kg**	563a-c	9.8ab	9.5a-c	1.03a	620a-c	11.4a	9.5b-d	1.20ab
	180 kg	568a-c	10.7a	10.2a	1.05a	614a-c	10.8ab	8.7de	1.24a
	100 kg	313ef	8.2cd	8.2de	1.00ab	300ef	7.8gh	8.6de	0.90fg
Fado (Samtrade)	**140 kg**	338d-f	8.4c	8.7b-d	0.96ab	321ef	7.9gh	8.9de	0.90fg
	180 kg	342d-f	8.4c	8.5cd	0.99ab	321ef	8.1f-h	9.0c-e	0.89fg
	100 kg	223f	7.0d	7.2e	0.97ab	246f	7.0h	7.1g	1.05cd
KMA 104 (Taki)	**140 kg**	270ef	7.8cd	7.7de	1.01ab	297ef	7.9gh	7.5fg	0.97d-g
	180 kg	323ef	8.3c	8.3d	1.00ab	362b-f	8.4f-g	8.3ef	1.01de

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Table 2: Effect of potassium rates, Egyptian Galia F_1 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.

Treatments		Season 2019				Season 2020			
Cultivars	**Potassium rates**	**Flesh diameter**	**Seed cavity diameter**	**TSS**	**Flesh weight**	**Flesh diameter**	**Seed cavity diameter**	**TSS**	**Flesh weight**
GH0913(GW x Hira4) Egyptian Galia F1		2.72a-c	7.40a	11.48b	600.96a	2.56b	8.13a	12.28a	565.43a
GK0911(GW X Kyouli) Egyptian Galia F1		2.65bc	6.85b	11.90ab	367.14b	2.48b	6.16c	12.91a	343.12c
Primal (Syngenta)		2.97ab	7.16ab	13.01ab	547.18a	3.07a	7.22b	13.81a	566.68a
Ideal (Syngenta)		2.99a	6.80b	12.66ab	531.11a	2.72b	6.35c	13.73a	483.15b
Fado (Samtrade)		2.59c	5.87c	13.42a	289.31bc	2.72b	6.11cd	13.20a	304.64c
KMA 104 (Taki)		2.12d	5.61c	12.98ab	236.31c	1.92c	5.75d	13.87a	213.34d
	100 kg	2.53b	6.77a	11.81b	381.05b	2.48a	6.59a	12.54b	363.85b
	140 kg	2.65ab	6.48a	12.76a	426.35a	2.55a	6.58a	13.07b	410.92b
	180 kg	2.84a	6.59a	13.16a	478.60a	2.70a	6.70a	14.30a	463.40a
The interaction									
	100 kg	2.53c-f	7.47a	10.67c	573.98ab	2.37de	8.27a	11.95cd	536.43a-c
GH0913(GW x Hira4) Egyptian Galia F1	**140 kg**	2.73a-e	7.47a	11.60bc	591.30ab	2.55b-d	8.27a	11.63d	552.62a-c
	180 kg	2.90a-c	7.27a	12.17a-c	637.60a	2.76bd	7.86ab	13.26a-d	607.24a
	100 kg	2.57c-f	6.87a-c	11.23bc	294.43d-f	2.40de	6.18e-g	11.90cd	275.17e-g
GK0911(GW X Kyouli) Egyptian Galia F1	**140 kg**	2.65b-f	6.85a-c	11.90bc	367.14c-e	2.48cd	6.16e-g	13.05a-d	343.12d-f
	180 kg	2.73a-e	6.83a-c	12.57a-c	439.84b-d	2.55b-d	6.15e-g	13.79a-d	411.07ce
	100 kg	2.73a-e	7.17ab	12.13a-c	482.13a-c	2.79bd	7.07b-e	13.35a-d	491.97a-c
Primal (Syngenta)	**140 kg**	2.97a-c	7.13ab	13.30ab	569.70ab	3.06ab	7.21bcd	13.46a-d	587.32ab
	180 kg	3.20ab	7.17ab	13.60ab	589.70ab	3.37a	7.39a-c	14.63ab	620.74a
	100 kg	2.83a-c	6.93a-c	11.80bc	463.45bc	2.56b-d	6.44c-f	12.96a-d	413.80ce
Ideal (Syngenta)	**140 kg**	2.87a-c	6.77a-c	13.17ab	498.22a-c	2.60b	6.54c-f	13.77a-d	456.66bcd
	180 kg	3.27a	6.70a-c	13.00a-c	631.67a	2.99a-c	6.08e-g	14.46a-c	578.98ab
	100 kg	2.43c-f	6.03cd	12.83a-c	274.39ef	2.91a-d	5.92fg	12.58bd	285.83eg
Fado (Samtrade)	**140 kg**	2.57c-f	5.60de	13.00a-c	295.36d-e	2.67b-d	6.09e-g	12.74bd	310.90d-g
	180 kg	2.77a-d	5.97c-e	14.43a	298.17d-f	2.59b-d	6.32d-f	14.29a-c	317.20d-g
	100 kg	2.07f	6.17a-d	12.17a-c	197.91f	1.88e	5.67fg	12.51bd	179.92g
KMA 104(Taki)	**140 kg**	2.13ef	5.03e	13.60ab	236.40ef	1.94e	5.21g	13.75a-d	214.91fg
	180 kg	2.17d-f	5.63de	13.17ab	274.61ef	1.93e	6.37d-f	15.37a	245.19fg

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Table 3: Effect of potassium rates, Egyptian Galia F_1 hybrids comparing with commercial cultivars and their interaction on fruit yield and its component during 2019 and 2020 seasons.

Treatments		Season 2019				Season 2020			
Cultivars	**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		352e	4.3bc	2984a	17.907a	402e	4.4b	3203a	19.218a
GK0911 (GW X Kyouli) Egyptian Galia F1		1084d	4.1c	1734c	10.404c	1174d	4.4b	2005bc	12.030bc
Primal (Syngenta)		124f	4.7a	3038a	18.228a	201f	5.0a	3154a	18.927a
Ideal (Syngenta)		1504c	4.3bc	2400b	14.402b	1584c	4.1b	2528b	15.169b
Fado (Samtrade)		3396a	4.6a	1518c	9.108c	3473a	4.1b	1278d	7.670d
KMA 104(Taki)		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									
	100 kg	0i	4.0b	2627b-e	15.760b-e	50i	4.0de	2811b-e	16.863b-e
GH0913(GW x Hira4) Egyptian Galia F1	**140 kg**	540h	4.3ab	2983a-d	17.900a-d	590h	4.5b-d	3304a-c	19.824a-c
	180 kg	516	4.7ab	3343ab	20.060ab	566h	4.7b-d	3495ab	20.969ab
	100 kg	0i	4.0b	1339ij	8.035ij	90i	4.0de	1433f-h	8.597f-h
GK0911 (GW X Kyouli) Egyptian Galia F1	**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
	100 kg	0i	4.3ab	2495c-f	14.967c-f	77i	4.3b-e	2421c-e	14.529c-e
Primal (Syngenta)	**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
	100 kg	1560ef	4.0b	2151f-i	12.906e-g	1640ef	3.6e	2200d-f	13.198d-f
Ideal (Syngenta)	**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
	100 kg	576h	4.0b	1251j	7.506j	653h	4.0de	1201gh	7.206gh
Fado (Samtrade)	**140 kg**	2748c	4.7ab	1595h-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	937j	5.624j	1112g	3.7e	913h	5.477h
KMA 104 (Taki)	**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

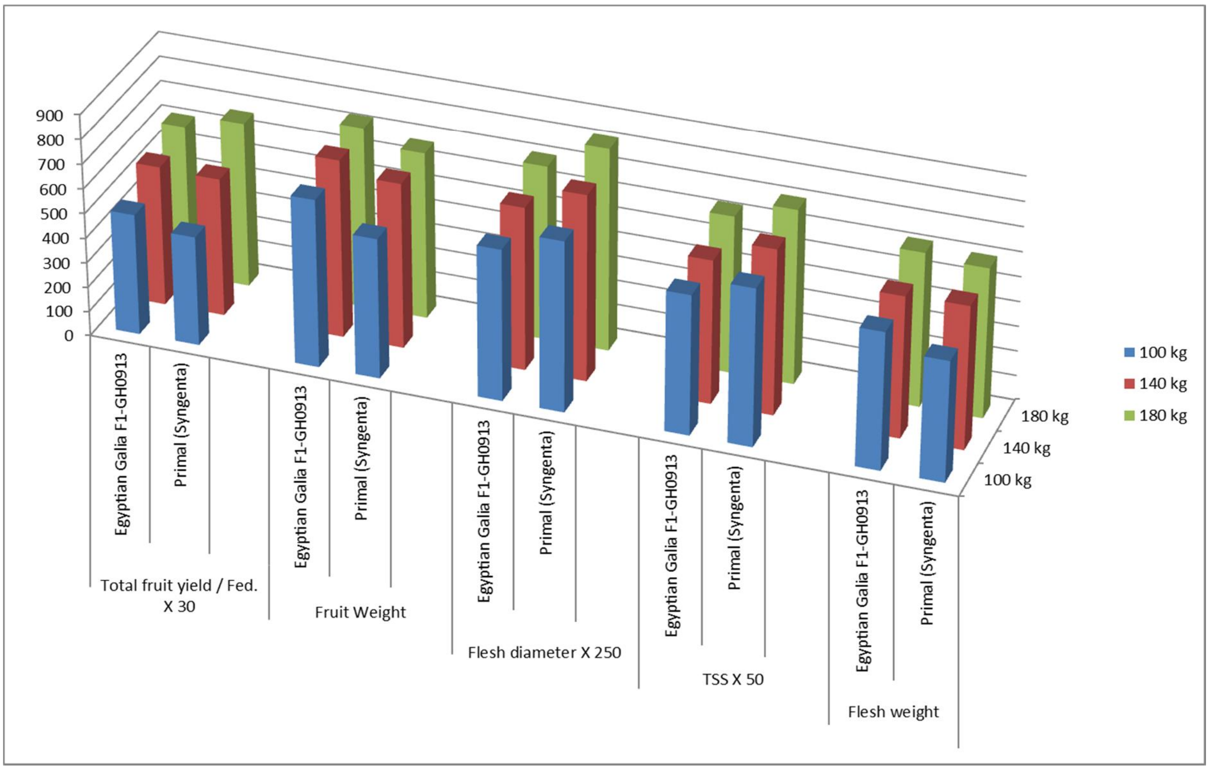

Fig. 1: General trend of comparative between Egyptian Galia F_1 hybrids "GH0913 (GW x Hira4) with commercial hybrids " Primal " under different potassium rates on total fruit yield / Fed., fruit weight, flesh diameter, TSS and flesh weigh as average between both seasons

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 F_1 "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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