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CROSSING AMONG SOME MELON INTRODUCED GENOTYPES FOR OBTAINING NEW HYBRIDS WITH BEST YIELD AND QUALITY

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ABSTRACT

This study was conducted during the period from 2012 to 2014 at Kaha Vegetable Research Farm (KVRF), Qalubia governorate to evaluate six introduced genotypes of melon (PI 414723, PI 124111, PI 140471, PI 313970, PI 124112, PI 140417) and their diallel F_1 hybrids in summer planting season. The results showed that the introduced genotype (1) and the hybrids 2x1 and 2x4 recorded the highest significant values for average plant length compared to the other introduced genotypes and the hybrids in summer season 2014 without significant differences between them 4x1, 5x3 and the hydride Primal produced the highest significant TSS values over all evaluated introduced genotypes and hybrids without significant differences between them. genotype 4 and hybrid 3x1 recorded the lowest significant TSS values, 6 The introduced genotypes and hybrids displayed the largest number of relevant fruits per plot (82) among all genotypes and hybrids introduced , but the lowest significant Fruits number per plot was found in 1x4 and 3x1. without significant differences between them. Mean while, the hybrid 4x5 produced the highest significant total yield per plant over all evaluated introduced genotypes and hybrids.

Key words: ***Melon introduced genotypes, F_1 hybrids, Cucumis melo L.***

INTRODUCTION

Melon, (*Cucumis melo* L.), is an important horticultural crop across wide areas of the world. Within the genus *Cucumis,* melon belongs to the sub genus melon, having 2n=24 chromosomes. Dantas *et al* (2012) A sample of twenty plant differentials was tested in the field: Edisto 47, MR-1, PM-5, PM-6, PM-45, Hales Best Jumbo, Vendrantais, PI 414723 and WMR-29. The first sample of PI 414723 differential compounds showed 100 percent genetic dissimilarity, the second group displaying differential MR-1 and the third group showed other differentials. 157 markers (alleles) RA were identified for molecular characterisation. The intermediate existence of PI 161375 indicated that the division of melon fruit ripening activity into only two distinct forms is over-simplification and that in fact there is a continuous continuum of fruit ripening behavior, certain carotenoids have also accumulated Saladié *et al* (2015), Kuzuya *et al* (2006) PMR 5, PI 124112, and MR-1 resist powdery mildew using both types of resistance. These two resistance processes correspond to different fungus races, suggesting that there are at least two types of gene-mediated resistance to powdery mildew in the same germplasm. Mokhtari *et al* (2012) revealed that the structure of the partial LRR domain is highly conserved between eight of these resistant accessions and is similar to the resistant allele in the previously characterized PI-161375 line. Conversely, PI-

124111 is a unique line that presents the same, Galala *et al* (2010). The twenty one breeding entries were compared with five commercial hybrids as for yield components and some fruit physical characters. The results also proved that many of the investigated traits were improved by hybridization, since recorded a favorable heterosis over the best parents was recorded in many combinations. Generally, the results indicated that some local F1 hybrids might be promising to be commercially competitive, since they produced a higher yield and better fruit quality than some commercial hybrids. Abo El-Noor, H. H. (2002) evaluted to Six muskmelon cultivars namely: Shahd Eldokki cv., Galia F_1, Primal F1, Regal F1, Vicar F1 and Ideal F1.

The aim of this investigation was to collect some melon introduced genotypes, identify, characterize and evaluate them for yield, and fruit quality in order to establish a breeding program for melon to improve this crop and raise a new hybrids.

MATERIALS AND METHODS

This study was conducted during the period from 2012 to 2014 at Kaha Vegetable Research Farm (KVRF), Qalubia governorate. Six introduced genotypes (PI 414723, PI 124111, PI 140471,PI 313970,PI 124112, PI 140417) from United States Department of Agriculture were used to evaluate them and their diallel crosses in summer season planting date. Primal hybrid used control in this study. The selfing of the six introduced genotypes was carried out twice in the open field at KVRF, in April 2012 and the cross were done in the second season (August 2012).

Experimental design

Six introduced genotypes and their crosses were evaluated in the open field in the summer seasons of 2014. Seeding date on March 26, 2014.

The experimental design used was a randomized complete block design (RCBD) with three replicates. All introduce genotypes and hybrids were randomly distributed in each replicate; that consisted of 25 plots, the plot (experimental plot) contained two ridges, 5.0 m long and 1.5 m wide (EP=15m^2). The distance between hills was 50 cm apart. For there each ridge consisted of 10 hills. The seeds were sown at the rate of two seeds/hill.

After full germination, plants were thinned to one plant/hill. All cultural practices were made as recommended for melon.

Characters measured

Vegetative traits

The data were recorded on ten plants randomly chosen from each plot of the three replicates for the following characters:

1. Average plant length

Average plant length (APL) was measured from soil surface to the end of main stem of plant. APL was determined after 60 days from sowing.

2. Average number of branches

Average number of branches (ANB) per plant was determined as the average number of branches on the main stem of plant, which was begun from the ground to 50 cm length.

Total yield per plant

Total yield per plant (TY) was measured as the weight of all fruits harvested at ripening stage from each plot/number of plants throughout the picking season.

Fruits number per plot

Fruit characteristics

1. Fruit placenta diameter (FPD)

2. Fruit shape index

Fruit shape index (FSI) was calculated as the ratio of fruit length (polar diameter) to fruit diameter (equatorial diameter) each plot was represented by five fruits.

3. Average fruit weight

Average fruit weight (AFW) was determined as the mean weight of five fruits, randomly chosen, from each plot.

4. Fruit flesh thickness

Fruit flesh thickness (FFT) was determined in a sample of five fruits/each plot.

5. Total soluble solids

Total soluble solids (TSS) were determined in five ripe fruits of each plot by using a hand refractometer.

Statistical analysis

Data obtained were statically analyzed using F-test (Snedecor and Cochran, 2014) and comparisons were based on the Duncan's multiple range test (Steel *et al* 1997).

RESULTS AND DISCUSSION

1. Vegetative traits

a. Average plant length (APL) and average number of branches (ANB)

Data obtained on (APL) of introduced melon genotypes and their F_1hybrids in the summer season of 2014 are presented in Table (1). The results showed significant differences among the evaluated introduced genotypes and their hybrids revealing a wide range of variation for this trait. The introduced genotypes (no. 1), hybrid 2x1 and 2x4 recorded the highest significant values for APL (195.8, 199.3, and 205.0 cm, respectively) without significant differences between them on the contrary, the lowest significant value for APL was recorded by the introduced genotypes and the hybrids 2 x 6 and 4x3 without significant differences between them. In summer season 2014, the highest significant ANB was obtained by the introduced genotypes and hyprids 3x2, 6x4 and Primal without significant differences between them with ANB being 4.6, 5.1and 4.9, respectively. The hybrids 6 x 2, 5 x 6, 5 x 3, 4 x 3, 3 x 5 and 1 x 5 had the lowest significant ANB but without significant differences between them. These results are in harmony with those reported by Saladié *et al* (2008), McCreight and Michael (2011)

Fruit placenta diameter (FPD) and total soluble solids (TSS)

Data obtained on FPD of melon introduced genotypes and hybrids in the summer season of 2014 are presented in Table (2). The results showed significant differences among the evaluated introduced genotypes and hybrids revealed a wide range of variation for this trait. In the summer season 2014, genotypes no. 4, 6 and the hybrid 2x4 exhibited the highest significant FPD (4.47, 5.53 and 5.57 cm, respectively) without significant differences between them. The genotype no. 2, and the hybrids 2x3, 4x6, 5x4, and 5x6 had the lowest significant FPD (4.37, 4.37, 4.37, 4.03 and 4.03 cm^2, respectively).

Table 1. Vegetative characters of different introduced genotypes and hybrids of melon plants at 60 days after sowing during the season of 2014.

Melon introduced genotypes and hybrids	Length of plant (cm)		Number of branches	
1 (PI 414723)	**195.8**	**b**	**4.3**	**cd**
2 (PI124111)	**125.2**	**hi**	**3.7**	**e-h**
3 (PI 140471)	**161.9**	**d**	**3.9**	**d-h**
4 (PI 313970)	**117.1**	**jk**	**3.8**	**e-h**
5 (PI 124112)	**180.3**	**c**	**3.8**	**d-h**
6 (PI 140417)	**140.1**	**f**	**3.6**	**fgh**
1 × 2	**180.3**	**c**	**4.1**	**cde**
1 × 3	**180.3**	**c**	**3.8**	**d-h**
1× 4	**125.3**	**hi**	**3.7**	**e-h**
1 × 5	**125.5**	**hi**	**3.5**	**gh**
1 × 6	**155.2**	**de**	**3.6**	**fgh**
2 × 1	**199.3**	**ab**	**4.2**	**cde**
2 × 3	**130.6**	**gh**	**3.8**	**d-h**
2 × 4	**205.0**	**a**	**4.6**	**bc**
2 × 5	**137.0**	**fg**	**4.3**	**cd**
2 × 6	**100.3**	**m**	**3.7**	**d-h**
3 × 1	**105.3**	**lm**	**3.6**	**gh**
3 × 2	**142.0**	**f**	**4.6**	**abc**
3 × 4	**136.7**	**fg**	**4.1**	**def**
3 × 5	**122.0**	**ij**	**3.5**	**gh**
3 × 6	**142.1**	**f**	3.9	**fgh**
4 × 1	**117.1**	**jk**	**3.6**	**d-h**
4 × 2	**160.4**	**d**	**3.9**	**gh**
4 × 3	**100.5**	**m**	**3.5**	**d-g**
4 × 5	**140.4**	**f**	**3.9**	**d-h**
4 × 6	**106.9**	**lm**	**3.8**	**e-h**
5 × 1	**120.5**	**ij**	**3.7**	**fgh**
5 × 2	**137.2**	**fg**	**3.6**	**gh**
5 × 3	**110.3**	**kl**	**3.5**	**fgh**
5 × 4	**135.3**	**fg**	**3.6**	**h**
5 × 6	**107.1**	**lm**	**3.4**	**fgh**
6 × 1	**130.2**	**gh**	**3.6**	**h**
6 × 2	**142.1**	**f**	**3.4**	**d-g**
6 × 3	**115.4**	**jk**	**3.9**	**a**
6 × 4	**142.0**	**e**	**5.1**	**ab**
Primal	**159.2**	**de**	**4.9**	**fgh**

Table 2. Fruit characteristics of introduced genotypes and hybrids of melon plants during the season of 2014.

Melon introduced genotypes and hybrids	Fruit placenta diameter (cm)		T.S.S (%)	
1 (PI 414723)	4.57	fg	11.50	Mn
2 (PI124111)	4.37	h	10.20	Lm
3 (PI 140471)	5.07	c	14.00	b-e
4 (PI 313970)	5.47	a	9.07	O
5 (PI 124112)	4.50	g	11.00	K
6 (PI 140417)	5.53	a	10.77	Kl
1 × 2	4.57	fg	11.47	Ij
1 × 3	4.50	g	11.00	K
1× 4	5.07	c	10.00	Mn
1 × 5	4.20	ij	13.47	Abe
1 × 6	5.33	b	11.10	K
2 × 1	4.83	de	11.07	K
2 × 3	4.37	h	10.08	Mn
2 × 4	5.57	a	14.40	Bc
2 × 5	4.90	d	12.20	Fgh
2 × 6	4.63	f	12.27	J
3 × 1	5.17	c	9.5	No
3 × 2	5.43	lm	14.17	Bcd
3 × 4	6.03	fg	12.33	e-h
3 × 5	6.27	e	12.10	Ghi
3 × 6	5.53	kl	13.30	Bc
4 × 1	5.23	no	15.13	a
4 × 2	5.13	no	14.13	bcd
4 × 3	7.07	fg	13.13	f-i
4 × 5	5.77	hi	14.00	b-e
4 × 6	4.37	m	13.53	d-g
5 × 1	5.53	kl	13.20	fgh
5 × 2	6.03	fg	12.77	hij
5 × 3	5.53	kl	14.70	ab
5 × 4	4.03	o	13.80	c-f
5 × 6	4.03	o	13.10	ghi
6 × 1	5.13	no	13.00	ghi
6 × 2	5.83	h	14.20	bcd
6 × 3	5.63	jk	13.33	e-h
6 × 4	5.83	h	13.03	ghi
Primal	5.63	jk	15.10	a

Data obtained on TSS of introduced genotypes and hybrids in the 2014 summer plantings are presented in Table (2). The results showed significant differences among the evaluated introduced genotypes and hybrids revealing a wide range of variation for this trait. In 2014, the hybrids 4x1, 5x3 and the check Primal produced the highest significant TSS value (15.13%, 14.70% and 15.10% respectively) over all evaluated introduced genotypes and hybrids without significant differences between them. The genotype no. 4 and the hybrid 3x1 recorded the lowest significant TSS values (9.07% and 9.50% respectively). These results are in accordance with the results obtained by McCreight' and Hsing-Yeh (2008)

Fruit shape index (FSI)

Data obtained on FSI of introduced genotypes and hybrids in the 2014 summer plantings are presented in Table (3). The results showed significant differences among the evaluated introduced genotypes and hybrids, revealing a wide range of variation for this trait. The highest significant FSI was obtained by the hybrid 1x6, followed by the hybrid 2x1.

Fruit flesh thickness (FFT)

Data obtained on FFT of introduced genotypes and hybrids in the 2014 summer plantings are presented in Table (3). The results showed significant differences among the evaluated introduced genotypes and their hybrids, revealing a wide range of variation for this trait. Primal had the highest significant FFT (3.8 cm) over all evaluated introduced genotypes and hybrids in 2014. The hybrids 1x3 and 1x2 ranked second in this trait, with significant differences with FFT being 3.63 and 3.67 cm, respectively, without significant differences between them. Meanwhile the genotypes no. 4 and 6 recorded the lowest significant FFT (1.93 and 2.03 cm, respectively) over all evaluated introduced genotypes and hybrids.

Fruits number per plot (FNP), total fruit yield per plant (TY) and average fruit weight (AFW)

Data obtained on FNP of introduced genotypes and hybrids in the 2014 summer plantings are presented in Table (4). The results showed significant differences among the evaluated introduced genotypes and hybrids revealing a wide range of variation for this trait.

Table 3. Fruit characteristics of introduced genotypes and hybrids of melon plants during the season of 2014.

Melon introduced genotypes and hybrids	Fruit shape (L/D ratio)		Fruit flesh thickness (cm)	
1 (PI 414723)	0.87	Tu	3.17	ij
2 (PI124111)	0.99	Kl	3.5	efg
3 (PI 140471)	0.95	no	3.6	cde
4 (PI 313970)	0.87	tu	1.93	m
5 (PI 124112)	1.08	def	3.63	bcd
6 (PI 140417)	0.93	pq	2.03	m
1 × 2	1.05	h	3.67	bc
1 × 3	1.08	def	3.63	bcd
1× 4	0.85	v	3.03	k
1 × 5	1.08	def	3.43	gh
1 × 6	1.25	a	2.63	l
2 × 1	1.24	b	2.57	l
2 × 3	1.04	hi	3.37	h
2 × 4	1.16	c	3.37	h
2 × 5	1.04	hi	3.6	cde
2 × 6	1.05	h	3.73	b
3 × 1	0.83	w	3.43	gh
3 × 2	0.96	n	3.53	d-g
3 × 4	1.07	f	3.37	h
3 × 5	0.87	tu	3.43	gh
3 × 6	1.0	K	3.23	I
4 × 1	0.94	P	3.57	c-f
4 × 2	1.06	gh	3.13	ijk
4 × 3	0.88	t	3.17	ij
4 × 5	0.98	m	3.67	bc
4 × 6	0.91	s	3.07	jk
5 × 1	1.0	k	3.37	h
5 × 2	0.98	m	3.47	fgh
5 × 3	1.02	j	3.37	h
5 × 4	0.99	klm	3.43	gh
5 × 6	1.06	gh	3.07	jk
6 × 1	1.06	gh	3.07	jk
6 × 2	0.95	no	3.47	fgh
6 × 3	1.02	j	3.57	c-f
6 × 4	1.06	gh	3.53	d-g
Primal	1.13	d	3.87	a

Table 4. Fruit yield of introduced genotypes and hybrids of melon plants during the season 2014.

Melon introduced genotypes and hybrids	Fruits number per plot		Mean fruit yield/plot (kg)		Average fruit weight (g)	
1 (PI 414723)	48	Lm	22.4	Mn	750	g-j
2 (PI124111)	61	c-f	27.5	Ef	704	Jk
3 (PI 140471)	55	Ij	26.6	F	753	f-I
4 (PI 313970)	52	Jk	18.7	Qr	563	Q
5 (PI 124112)	57	Ghi	28.9	Cd	797	Efg
6 (PI 140417)	82	A	22.9	Klm	450	R
1 × 2	57	Ghi	27.9	Def	759	e-h
1 × 3	57	Ghi	28.9	Cd	797	Efg
1× 4	41	Op	20.7	Op	871	D
1 × 5	62	Bcd	29.6	Cd	733	h-k
1 × 6	43	No	24.2	Ghi	952	Bcd
2 × 1	43	No	22.5	Lmn	882	Cd
2 × 3	60	d-h	22.9	j-m	601	Opq
2 × 4	46	Mn	29.7	Cd	1080	a
2 × 5	53	Jk	23.7	h-l	710	ijk
2 × 6	51	Kl	22.7	j-m	710	ijk
3 × 1	38	P	19.8	Opq	906	bed
3 × 2	62	Cde	27.8	Def	699	kl
3 × 4	60	d-g	28.9	Cd	749	hij
3 × 5	48	lm	18.2	R	599	opq
3 × 6	59	e-h	26.7	Ef	704	jk
4 × 1	58	f-i	23.8	h-k	648	mno
4 × 2	65	b	24.0	g-j	576	pq
4 × 3	50	kl	19.7	Pq	617	m-p
4 × 5	64	bc	31.9	B	7689	e-h
4 × 6	52	kl	21.2	No	644	mno
5 × 1	50	kl	24.8	Gh	798	ef
5 × 2	58	f-i	24.2	Ghi	655	lm
5 × 3	58	f-i	22.5	Klm	610	m-q
5 × 4	57	ghi	22.2	Mn	607	n-q
5 × 6	48	lm	19.4	Pqr	650	mno
6 × 1	57	ghi	23.3	i-m	643	mno
6 × 2	57	ghi	27.2	Ef	744	h-k
6 × 3	57	hi	25.2	G	699	kl
6 × 4	53	jk	26.7	Ef	705	e
Primal	63	bcd	37.8	a	922	bc

In 2014, the introduced genotypes 6 exhibited the highest significant FNP (82) over all introduced genotypes and hybrids, but the lowest significant FNP was recorded by the hybrids 1x4 and 3x1 TY/plant. (41 and 38, respectively) without significant differences between them.

Data obtained on TY/plant of introduced genotypes and hybrids in the 2014 summer plantings are presented in Table (4). The results showed significant differences among the evaluated introduced genotypes and hybrids revealing a wide range of variation for this trait. In 2014, the hybrid 4x5 produced the highest significant TY/plant over all evaluated introduced genotypes and hybrids. The lowest TY/plant value was obtained from the genotype no. 4 and the hybrid 3x5 (18.2 and 18.7 kg, respectively) without significant differences between them.

Data obtained on AFW of introduced genotypes and hybrids summer plantings are presented in Table (4). The results showed significant differences among the evaluated introduced genotypes and hybrids revealing a wide range of variation for this trait. the hybrid 2x4 had the highest significant AFW (1080 kg) over all evaluated introduced genotypes and hybrids without significant differences between them. In 2014, the lowest significant AFW was obtained by the ecotypes no. 4, and the hybrids 2x3 and 3x5 with AFW being 563, 601and 599 kg, respectively, without significant differences between them. These results are in harmony with those reported by Kuzuya *et al* (2006)

CONCLUSION

The introduced genotypes PI 313970 (no. 4) recorded the highest significant all most values at used in produce hybrids with male or female, Furthermore important in breeding programs.

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استخدام بعض الطرز الوراثية الأجنبية من القاوون للحصول على هجن جديدة ذات محصول وجودة عالية

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تمت هذه الدراسة خلال الفترة من ٢٠١٢ -٢٠١٤ فى محطة بحوث قها- القليوبية وذلك لتقييم ٦ طرز وراثية أجنبية (PI 414723, PI 124111, PI 140471, PI 313970, PI 124112, PI 140417) تم إستيرادها من وزارة الزر اعة الأمريكية و الهجن التبادلية الممكنة فى كلا الاتجاهين (هجن الجيل الاول) فى الموسم الصيفى ٢٠١٤ و أظهرت النتائج أن الطراز الوراثى رقم ١ و الهجن ٢ × ١ و ٢ ×٤ أعطت أعلى قيم معنوية فى طول النبات بدون أى إختلافات معنوية فيما بينهم. أعطت الهجن ٤ ×١ و ٥× ٣ و صنف المقارنة بريمال أعلى قيم معنوية بالنسبة لصفة المواد الصلبة الذائبة الكلية بدون فروق معنوية بينهم. ٤التركيب الوراثى رقم ٤ و الهجين ٣ ×١ أعطوا أقل قيم معنوية بالنسبة لصفة المواد الصلبة الذائبة الكلية و الطراز الوراثى رقم ٦ أعطى أعلى قيمة بالنسبة لصفة عدد الثمار لكل قطعة تجريبية (٨٢) و سجلت أقل قيمة لعدد الثمار للقطعة التجريبية الهجن ١ ×٤ و ٣ × ١بدون إختلافات معنوية فيما بينهم و ٤أعطى الهجين ٤×٥ أعلى قيمة بالنسبة للمحصول الكلى للنبات مقارنة ببقية الطرز الوراثية و الهجن.

المجلة المصرية لتربية النبات ٢٤(٤): ٨٨٩- ٩٠٠ (٢٠٢٠)