

EFFECT OF VARIETY AND PLANTING DATE ON YIELDING ABILITY, FRUIT CHARACTERISTICS AND STORAGE-ABILITY OF SOME CANTALOUPE VARIETIES UNDER UPPER EGYPT CONDITIONS

Ezzat, M. A.

Horticulture Res. Inst., Agriculture Res. Center, Ministry of Agriculture, A.R. Egypt.

ABSTRACT

This study was conducted on eight cantaloupe varieties (Galia, Toal, Ideal, Galor, Vicar, Rafigal, Regal and Primal) to investigate the effect of variety and planting dates on yielding ability, fruit characteristics and storageability. These varieties were cultivated at Isna – Qena governorate during the fall and winter seasons of 1998/1999 and 1999/2000.

The main results can be summarized as follows :

- 1- Early yield of Rafigal, Primal and Galia cvs at the first planting date were higher than that of the other varieties. On the other hand, Total and Galor cvs showed the lowest early yield in both seasons. Moreover, the first planting date was very productive compared to the others in both seasons.
- 2- Total yield of Rafigal, Galia and Ideal cvs had the highest total yield at different planting dates, while Regal, Galor and Total cvs produced the lowest yield.
- 3- Exportable yield was higher during the first planting date than that of other dates. However, Rafigal, Galia and Primal cvs produced the highest exportable yield at the first planting date, while Regal, Galor, Total and Ideal cvs produced low exportable yield in both seasons.
- 4- Regarding fruit characteristics, Rafigal, Galia, Total, Ideal and Galor cvs showed the highest values at the first planting date, where Primal, Regal and Vicar cvs exhibited the lowest values, concerning average fruit weight. Moreover, fruits of Galia, Rafigal, Ideal and Total cvs were higher than Galor, Vicar, Regal and Primal at the first planting date, concerning average exportable fruit weight. Concerning fruit shape index (L/D %), Rafigal, Vicar, Ideal and Primal cvs at the first planting date, generally, appeared to be higher in L/D % than Regal, Galor, Total and Galia cvs. With respect to T.S.S., Vicar, ideal and Rafigal cvs at the first planting date had the highest content of T.S.S. Moreover, the varieties Regal, Primal, Galia, Galor, and Total cvs showed the lowest contents, respectively. Concerning fruit firmness, Primal, Rafigal, Regal and Galia gave the higher degree of firmness, while Vicar, Ideal, Galor and Total, respectively showed the lowest values. However, fruits of the first planting date were firmer than that of second or third planting dates in both seasons.
- 5- Regarding to storageability, there were significant increase in weight loss and decay percent during storage period. Moreover, the rate of decrement in firmness was much higher with prolongation the storage period. However, the Primal, Regal and Rafigal cvs exhibited the least weight loss and decay percent compare to Total and Galor cvs which showed higher losses. Meanwhile Primal, Regal and Rafigal cvs showed the highest firmness value followed by Galia, Vicar and Ideal cvs, while Total and Galor cvs exhibited the least firmness values. On the other hand, the fruits from first planting date showed significantly lower in weight loss and decay percent but higher firmness compare to those of second or third.

With respect to chemical composition, there were decrease in T.S.S., sugars and ascorbic acid contents with the prolongation of storage period. However, fruits of Vicar and Ideal cvs had higher values in this respect than the other varieties under test. On the other hand, T.S.S., total sugars and Vit. C values reached the maximum amounts at the first planting date.

INTRODUCTION

Cantaloupe is very important crop for export in Egypt. The area cultivated with cantaloupe in lower Egypt became limited because of Sudden Wilt diseases which affected cantaloupe production during the fall season. Environmental conditions in Upper Egypt during the fall season are suitable for cantaloupe production because of temperature, humidity, light intensity and duration, direct sun light exposure, wind ... etc., which affected cantaloupes production, fruit quality, and post-harvest storability (Ryall and Lipton, 1979; Wills *et al.*, 1982; Stanely, 1991). Therefore, the planting date is very important factor with directly or indirectly affected cantaloupe yield, fruit quality and storability.

The early and total yield of cantaloupe fruits differs greatly from one variety to another due to the genetic differences among varieties (El-Deweny, 1978; Stanely, 1991; Abd El-Khalek, 1996; Ibarra *et al.*, 2001). At Qena Governorate, a sizeable attention has been focused towards this crop because of the favourite climatological and soil conditions and the tendency towards early cropping at this area.

Many investigators reported that there were significant differences in characters of all cultivars at picked time as well as during storage period (Ezzat, 1991; Abd El-Khalek, 1996 and Bigalke *et al.*, 2001).

It is well known from the physiological point of view that respiration primarily involves the enzymatic oxidation of sugars to CO₂ and water, accompanied by a release of energy. Hence, the rate of respiration after is a good index to the storage life of a crop: the higher the rate, the shorter the life, and lower the rate, the longer in the life. Moreover, cantaloupes fruits have a high rate of metabolism and will destroy themselves in relatively short time, even without the presence of decay organisms (Stanely, 1991; Bigalke *et al.*, 2001).

However, there were changes in physical and chemical contents of melon fruits during storage as reported by Evensen (1983); Hardenburg *et al.* (1986); Ezzat (1991); Abd El-Khalek (1996); Li XIU XIU *et al.* (2001) on melon.

So that, this work were conducted to investigate the effect of variety and planting date on yielding ability, fruit characteristics and their storageability.

MATERIALS AND METHODS

This experiment was conducted at Isna - Qena governorate during 1998/1999 and 1999/2000 seasons. Eight imported cantaloupe varieties namely, Galia (Hazera), Total (Novartis), Ideal (Novartis), Galor (Hazera), Vicar (Novartis), Rafigal (Hazera), Regal (Novartis), and Primal (Novartis) were used.

Seeds of different cultivars were sown on September 28th 1998 and 1999 for the fall seasons in the open field. As for the winter seasons, seeds sowing was carried out on November 21st and December 20th, for 1998/1999 and 1999/2000, respectively, under polyethylene tunnels.

Labeled fruits where they were picked at 45-days after anthesis. Normal cultural practices were followed whenever needed according to the recommendation of the Ministry of Agriculture.

Data were recorded as follows :

A. Yield Component :

- 1- Early yield/plant (Kg), determined as weight of fruits picked during the first two weeks.
- 2- Total yield/plant (Kg), determined as weight of fruits picked all over the season.
- 3- Exportable yield/plant (Kg), determined as the total yield after discarding the damage, big and malformed fruits.

B. Fruit characteristics :

Ten fruits were used to determine the following characters :

- 1- Average fruit weight (Kg), using Top balance loading.
- 2- Average exportable fruit weight (Kg), using Top balance loading.
- 3- Fruit shape index (L/D ratio), calculated as length/diameter (cm).
- 4- Total soluble solids, measured by hand refractometer (Wills *et al.*, 1982).
- 5- Firmness, determined by Magness and Ballauf pressure tester equipped with 3/16 inch plunger and adjusted in Newton (as recommended by ASHS post-harvest working group).

C. Keeping quality :

Fruits were immediately transferred to the laboratory, where discarded the misshaped and healthy fruits were chosen. Fruits were stored in cold storage (2.5°C and 90% R.H.). Moreover, fruits were packed in five Kg carton boxes before storage. All treatments were carried out in three replicates.

The determination of physical and chemical properties was due every 7 days during storage, starting at the beginning of storage period.

- 1- Weight losses of fruits was estimated by the following equation :

$$\text{Weight loss \%} = \frac{\text{Initial weight} - \text{weight at sampling date}}{\text{Initial weight}} \times 100$$

- 2- **Decay percent** : Decay fruits were removed, weighted and recorded. They included all the shrunked, injured or spoiled fruits resulting from fungal or bacterial infection. Percentage of decay was calculated in relation to the initial weight of stored fruits.
- 3- **Firmness** : Firmness were determined during storage period using the method mentioned before.

D- Chemical composition :

- 1- Total soluble solids : were determined using the method mentioned before.
- 2- Total sugar content analyzed according to Shaffer and Hartman (1921).
- 3- Ascorbic acid contents were determined as mg/100 ml juice using 2.6 dichlorophenol-indophenol for titration (A.O.A.C., 1970).

A split-plot design with three replicates was used to analyse post-harvest treatments. The varieties were in the main plots while, the planting dates were in sub-plots.

All data were subjected to statistical analysis according to (Snedecor, 1962).

RESULTS AND DISCUSSION

A. Yield Component :

1- Early yield :

Table (1) demonstrates that Rafigal, Primal and Galia cvs produced the highest early yield with significant differences between them during the two seasons. On the other hand, significant differences were found between them and the other tested varieties. In this respect, Total and Galor cvs showed the lowest early yield with significant differences between them. The differences among the varieties might be due mainly to the genetic differences. Moreover, there were significant between the planting date. However, the first planting date was very productive compared to the others in both seasons. These results might be attributed to environmental factors.

From the obtained results, it can be concluded that the early yield of Rafigal, Primal and Galia cvs at the first planting date were higher in the two seasons than that of the other cultivars.

Similar findings were obtained by Locascio *et al.* (1976), Rizkalla *et al.* (1987), Abd El-Khalek (1996) Ezzat (1999) on melon.

2- Total yield :

The cultivars Rafigal, Galia and Ideal had the highest total yield/plant at different planting dates with significant differences between them (Table 1), while Regal, Galor and Total cvs produced the lowest yield. That could be attributed to hereditary differences among varieties, and environmental factors which affected fruit quality at harvest.

These results are in harmony with those obtained by Locascio *et al.* (1976), Hamail *et al.* (1992) and Emarah *et al.* (1984).

3- Exportable yield :

The exportable yield was higher during the first planting date than that of other dates. Rafigal, Galia and Primal cvs produced the highest exportable yield at the first planting date season. On the other hand, Regal, Galor, Total and Ideal cvs produced low exportable yield with significant differences between them (Table 2 and Fig. 1).

Varietal differences could be attributed to the genetical differences, as stated by El-Deweny (1978), Ezzat (1991), and Abd El-Khalek (1996).

Table (1) : Effect of variety and planting date on early yield and total yield of some Cantaloupe varieties during seasons (1998/1999 and 1999/2000).

Variety	Character	Planting date	1998/1999			1999/2000				
			Early yield		Total Yield		Early yield		Total Yield	
			Kg/ plant	Weight ton/fed.	Kg/ plant	Weight ton/fed.	Kg/ plant	Weight ton/fed.	Kg/ plant	Weight ton/fed.
Galia	First	0.55	2.750	1.661	8.300	0.52	2.600	1.546	7.730	
	Second	0.50	2.500	1.451	7.250	0.49	2.450	1.352	6.750	
	Third	0.46	2.300	1.232	6.150	0.45	2.250	1.114	5.570	
Total	First	0.34	1.700	1.370	6.850	0.31	1.550	1.223	6.115	
	Second	0.29	1.450	1.131	6.550	0.26	1.300	1.004	5.020	
	Third	0.25	1.250	0.900	4.500	0.22	1.100	0.805	4.025	
Ideal	First	0.39	1.950	1.543	7.700	0.37	1.850	1.434	7.170	
	Second	0.32	1.600	1.321	6.600	0.30	1.500	1.162	5.810	
	Third	0.28	1.400	1.100	5.500	0.26	1.300	0.941	4.705	
Galor	First	0.28	1.400	1.246	6.230	0.25	1.250	1.142	5.710	
	Second	0.26	1.300	1.134	5.670	0.23	1.150	0.931	4.655	
	Third	0.19	0.950	1.000	5.000	0.16	0.800	0.752	3.760	
Vicar	First	0.43	2.150	1.432	7.150	0.41	2.050	1.245	6.225	
	Second	0.40	2.000	1.231	6.150	0.38	1.900	1.062	5.300	
	Third	0.33	1.650	1.100	5.500	0.31	1.550	0.934	4.670	
Rafigal	First	0.61	3.050	1.762	8.800	0.58	2.900	1.515	7.575	
	Second	0.58	2.900	1.568	7.840	0.55	2.750	1.342	6.700	
	Third	0.51	2.550	1.311	6.555	0.48	2.400	1.161	5.805	
Regal	First	0.58	2.900	1.234	6.170	0.56	2.800	1.024	5.120	
	Second	0.54	2.700	1.116	5.580	0.52	2.600	0.936	4.680	
	Third	0.43	2.150	0.954	4.750	0.43	2.150	0.427	3.620	
Primal	First	0.72	3.600	1.464	7.230	0.71	3.550	1.251	6.250	
	Second	0.64	3.200	1.352	6.760	0.61	3.050	1.162	5.180	
	Third	0.58	2.900	1.241	6.205	0.55	2.750	1.041	5.205	
L.S.D. at 0.05			0.02	0.17	0.04	0.15	0.02	0.14	0.03	0.12
Varieties			0.03	0.19	0.04	0.14	0.02	0.13	0.02	0.11
Planting dates			0.02	0.15	0.03	0.11	0.03	0.12	0.03	0.13
Varieties X planting dates										

Table (2) : Effect of variety and planting date on exportable yield of some Cantaloupe varieties during seasons (1998/1999 and 1999/2000).

Season		1998/1999		1999/2000	
Character		Exportable yield		Exportable Yield	
Variety	Planting date	Kg/ plant	Weight ton/fed.	Kg/ plant	Weight ton/fed.
Galia	First	0.584	2.900	0.561	2.800
	Second	0.441	2.200	0.423	2.100
	Third	0.322	1.600	0.301	1.500
Total	First	0.397	1.950	0.372	1.950
	Second	0.381	1.900	0.363	1.600
	Third	0.262	1.300	0.241	1.200
Ideal	First	0.452	2.250	0.434	2.150
	Second	0.374	1.850	0.351	1.750
	Third	0.312	1.550	0.293	1.450
Galor	First	0.362	1.800	0.342	1.700
	Second	0.344	1.700	0.321	1.600
	Third	0.281	1.400	0.262	1.300
Vicar	First	0.410	2.000	0.361	1.800
	Second	0.360	1.900	0.343	1.700
	Third	0.340	1.700	0.321	1.600
Rafigal	First	0.724	3.600	0.702	3.500
	Second	0.619	3.050	0.591	2.950
	Third	0.580	2.900	0.564	2.800
Regal	First	0.391	1.950	0.401	2.000
	Second	0.382	1.900	0.372	1.850
	Third	0.331	1.650	0.311	1.550
Primal	First	0.562	2.800	0.541	2.700
	Second	0.464	2.300	0.442	2.200
	Third	0.401	2.000	0.381	1.900
L.S.D. at 0.05 Varieties		0.04	0.18	0.02	0.15
Planting dates		0.03	0.16	0.04	0.14
Varieties X planting dates		0.04	0.11	0.03	0.12

B. Fruit characteristics:**1- Average fruit weight:**

From Table (3), it appears that the first planting date season had effect on all fruit characteristics for all tested varieties. In this connection, Rafigal, Galia, Total, Ideal and Galor cvs showed the highest values at the first planting date, where Primal, Regal and Vicar cvs exhibited the lowest value, concerning average fruit weight.

2- Average exportable fruit weight :

Regarding average exportable fruit weight, it appears from Table (3) that fruits of Galia, Rafigal, Ideal and Total cvs were higher than Galor, Vicar, Regal and Primal at the first planting date.

3- Fruit shape index (L/D ratio) :

Concerning fruit shape index (L/D %), data in Table (3) reflected the variations in L/D % as affected by the varieties and planting dates. It could be

Table (3): Effect of variety and planting date on fruit characteristics of some Cantaloupe varieties during seasons (1998/1999 and 1999/2000).

Season Character	1998/1999						1999/2000					
	Planting date	Aver. Fruit weight (Kg)	Aver. export. Fruit weight (kg)	L/D %	T.S.S.%	Firmness (pound/Inch ³)	Planting date	Aver. Fruit weight (Kg)	Aver. export. Fruit weight (kg)	L/D %	T.S.S.%	Firmness (pound/Inch ³)
Galia	First	0.87	0.84	1.04	13.90	22.89	First	0.93	0.90	1.06	15.15	23.49
	Second	0.63	0.75	1.02	13.60	22.29	Second	0.69	0.81	1.04	14.86	22.89
	Third	0.31	0.50	0.97	12.90	21.30	Third	0.37	0.56	1.00	14.32	21.90
Total	First	0.88	0.81	1.04	11.15	16.60	First	0.94	0.87	1.05	12.49	17.20
	Second	0.57	0.54	0.94	10.50	16.20	Second	0.63	0.60	0.97	11.95	16.80
	Third	0.33	0.50	0.93	9.75	15.13	Third	0.39	0.56	0.95	11.22	15.73
Ideal	First	0.83	0.80	1.06	15.30	20.29	First	0.89	0.86	1.08	16.38	20.89
	Second	0.80	0.64	1.03	14.75	20.04	Second	0.86	0.70	1.05	15.95	20.64
	Third	0.30	0.46	0.92	14.20	19.77	Third	0.35	0.51	0.96	15.41	20.37
Galor	First	0.80	0.59	1.02	12.50	17.20	First	0.86	0.65	1.04	13.88	17.80
	Second	0.54	0.50	1.00	12.15	16.12	Second	0.60	0.56	1.02	13.52	16.72
	Third	0.29	0.43	1.00	11.60	15.83	Third	0.34	0.49	1.01	13.03	16.43
Vicar	First	0.57	0.61	1.07	15.05	21.91	First	0.63	0.67	1.09	16.19	22.51
	Second	0.45	0.53	1.04	14.75	21.33	Second	0.51	0.59	1.06	15.60	21.93
	Third	0.28	0.45	0.91	14.10	20.66	Third	0.34	0.51	0.95	15.28	21.26
Rafigal	First	0.86	0.84	1.07	14.60	24.89	First	0.92	0.90	1.09	15.67	25.49
	Second	0.82	0.78	1.05	14.05	23.41	Second	0.88	0.84	1.07	15.21	24.01
	Third	0.39	0.54	0.96	13.60	22.54	Third	0.45	0.60	0.98	15.00	23.14
Regal	First	0.55	0.60	1.02	14.50	23.45	First	0.61	0.66	1.04	15.57	24.05
	Second	0.38	0.50	1.00	14.00	22.71	Second	0.44	0.57	1.02	15.09	23.13
	Third	0.34	0.43	0.91	13.40	21.64	Third	0.38	0.49	1.00	14.52	22.24
Primal	First	0.67	0.65	1.06	14.45	24.95	First	0.73	0.71	1.08	15.52	25.55
	Second	0.60	0.60	1.04	13.90	24.13	Second	0.66	0.66	1.06	14.98	24.73
	Third	0.29	0.51	0.99	13.20	23.89	Third	0.65	0.57	1.02	14.42	24.49
L.S.D. at 0.05 Varieties	0.04	0.02	0.01	0.12	0.36	0.05	0.03	0.01	0.14	0.39	0.39	
Planting dates	0.02	0.03	0.01	0.11	0.33	0.04	0.03	0.02	0.12	0.35	0.35	
Varieties X planting dates	0.04	0.02	0.02	0.12	0.35	0.03	0.02	0.01	0.11	0.32	0.32	

Ezzat, M. A.

suggested that the varieties at the first planting date were significantly higher values in this respect than the other planting dates. Rafigal, Vicar, Ideal and Primal cvs, generally, appeared to be higher in L/D % than Regal, Galor, Total and Galia cvs.

4- Total soluble solids (T.S.S.) content:

With respect to total soluble solids were higher in first planting date than the second or third seasons. Vicar, Ideal and Rafigal had the highest contents of T.S.S. during the first planting date. Moreover, the varieties Regal, Primal, Galia, Golar and Total showed the lowest contents, respectively (Table 3).

5- Fruit firmness :

Data in Table (3) showed clearly that, fruits of the first planting date were firmer than that of second or third planting date seasons with significant difference between them. Moreover, the varieties Primal, Rafigal, Regal and Galia gave the higher degree of firmness, while Vicar, Ideal, Galor and Total, respectively showed the lowest values.

Similar results were obtained by Ezzat (1991) and Abd El-Khalek (1996) on melon.

C. Keeping Quality :

1- Changes during storage :

Data concerning the effect of storage condition on keeping quality are presented in Table (4).

Regarding the weight loss and decay percent, data show obviously that there were significant and consistent increase in weight loss and decay percent during storage period at cold storage for 28 days. The decay and weight loss percent were increased with prolongation the storage period.

These finding might be due to the higher biological activity at the later period of storage and this in turn facilitate fruit infection with micro-organisms. The decrease in fruit weight be due to the increase in water loss and dry matter consumption in respiration and other metabolic reactions.

Concerning the fruit firmness, data indicated a significant and gradual decrease in firmness value. However, the rate of decrement in firmness was much higher with prologation the storage period.

These results might be owe much to that the conversion of protopectins to soluble pectins and conversion of insoluble carbohydrates to soluble sugars. On the other hand, the high accumulation of ethylene in diametric fruits are associated with high respiration rate, which in turn affect the ripening processes of fruit and make fruits were soft, as stated by Ryall and Lipton (1979) and Wills *et al.* (1980) on melon.

Similar results were obtained by Ezzat (1991) and Abdel Khalek (1996) on melon.

2- Effect of variety:

Data concern with fruit keeping quality are presented in Table (4). Regarding the varietal differences in keeping quality, data show obviously that there were significant and consistent differences between tested varieties. However, the Primal, Regal and Rafigal varieties exhibited the least weight loss and decay percent compare to Total and Galor vrs. which showed higher weight loss and decay percent. Meanwhile, Primal, Regal and Rafigal vrs. showed the highest firmness values followed by Galia, vicar and Ideal, while Total and Galor vrs. exhibited the least firmness value. That could be attributed to heridital differences among varieties.

These results are in agreement with those obtained by Evensen (1983), Ezzat (1991) and Abd El-Khalek (1996) on melon.

3- Effect of planting date :

Data in Table (4) showed also that, the fruits from third planting date exhibited significantly higher losses (weight loss decay percent, and lower firmness) compare to those of first or second.

Table (4) : Effect of storage period, variety and planting date on physical properties of Cantaloupe fruits during seasons (1998/1999 and 1999/2000).

	1998/1999			1999/2000		
	Weight loss (%)	Decay (%)	Firmness (pound/ Inc ²)	Weight loss (%)	Decay (%)	Firmness (pound/ Inc ²)
Effect of storge period/days :						
0	--	--	20.79	--	--	21.39
7	2.54	4.51	19.38	3.14	5.11	19.98
14	3.90	5.34	18.45	4.50	5.94	19.05
21	7.64	7.52	16.78	8.24	8.12	17.38
28	9.60	11.62	15.47	10.20	12.22	16.07
L.S.D. at 0.005	0.16	--	0.43	0.18	--	0.45
Effect of variety :						
Galia	4.23	5.37	18.94	4.83	5.97	19.54
Total	9.86	13.21	13.24	9.31	13.81	13.84
Ideal	7.42	8.03	16.75	6.98	8.63	17.35
Galor	9.06	14.51	13.29	9.66	15.11	13.89
Vicar	6.12	6.94	18.41	6.72	7.54	19.01
Rafigal	3.68	5.47	21.52	3.33	6.07	22.12
Regal	3.87	5.09	20.51	4.47	5.69	21.11
Primal	3.16	3.75	22.52	3.76	4.35	23.12
L.S.D. at 0.05	0.27	--	0.34	0.29	--	0.36
Effect of planting date :						
First	4.20	6.81	19.03	5.59	7.12	19.63
Second	5.84	7.86	18.26	6.44	8.46	18.86
Third	6.93	9.02	17.16	7.53	9.61	17.76
L.S.D. at 0.05	0.14	--	0.41	0.16	--	0.40

These results might be attributed to environmental factors (temperature, humidity, light intensity and duration, direct sun light exposure, ... etc.) which affected fruit quality at harvest and consequently its storability (Locascio *et al.*, 1976).

4- Effect of interaction (Variety X Planting date) on physical properties of Cantaloupe fruits :

Data regarding the effect of interaction on physical properties are shown in Table (5 and Fig. 2).

A significant and consistent differences in losses of weight and decay percent were detected among the tested hybrids at different planting dates. Primal, Regal and Rafigal at different planting dates are outstanding in keeping quality compared with other varieties. These might be due to the genetic differences, which caused variations in physical properties of the fruits (Ryall and Lipton, 1979). Moreover, Primal, Regal and Rafigal fruits at different planting dates were firmer than the other tested hybrids.

These results might be due to environmental conditions, changes in the overall pattern of the cell composition and structure with the progressive solubilization and depolymerization of pectic substances (Ryall and Lipton, 1979).

Table (5) : Effect of interaction (variety X planting date) on physical properties of Cantaloupe fruits during seasons (1998/1999 and 1999/2000).

Variety	Planting date	1998/1999			1999/2000		
		Weight loss (%)	Decay (%)	Firmness (pound/Inch ²)	Weight loss (%)	Decay (%)	Firmness (pound/Inch ²)
Galia	First	3.46	4.25	19.99	4.06	4.85	20.59
	Second	3.96	5.45	19.00	4.56	6.05	19.60
	Third	5.27	6.41	17.84	5.88	7.01	18.44
Total	First	8.71	11.37	14.08	9.31	11.97	14.68
	Second	10.01	13.43	13.54	10.61	14.03	14.14
	Third	10.87	14.85	12.11	11.47	15.45	12.71
Ideal	First	6.38	6.93	17.29	6.98	7.53	17.29
	Second	7.37	8.09	16.93	7.97	8.69	17.53
	Third	8.51	9.10	16.05	9.11	9.70	16.65
Galor	First	8.07	12.72	14.25	8.67	13.32	14.85
	Second	8.91	14.71	13.26	9.51	15.31	13.86
	Third	10.19	16.09	12.36	10.79	16.69	12.96
Vicar	First	5.02	5.81	19.29	5.62	6.41	19.89
	Second	6.25	6.92	18.63	6.85	7.52	19.23
	Third	7.10	8.09	17.33	7.70	8.69	17.93
Rafigal	First	2.73	4.37	22.74	3.33	4.97	23.34
	Second	3.54	5.50	21.51	4.14	6.10	22.11
	Third	4.77	6.56	20.33	5.37	7.16	20.93
Regal	First	3.14	3.94	21.61	3.74	4.54	22.21
	Second	3.76	5.12	20.61	4.36	5.72	21.21
	Third	4.70	6.21	19.32	5.30	6.81	19.95
Primal	First	2.47	2.75	23.00	3.07	3.35	23.60
	Second	2.99	3.67	22.60	3.59	4.27	23.20
	Third	4.04	4.84	21.96	4.64	5.44	22.56
L. S. D. at 0.05		0.15	--	0.31	0.17	--	0.33

5- Effect of interaction (variety X storage period) :

Concerning the weight loss and decay percent, data in Table (6) show obviously that, in all varieties under test, there were significant and considerable increase in losses values with the progress of storage period. However, Primal, Regal and Rafigal cvs during storage period exhibited lower losses percent and firmer than the others. These results might be attributed to evaporation and respiration (Wills *et al.*, 1982).

Table (6) : Effect of interaction (variety X storage period) on physical properties of Cantaloupe fruits during seasons (1998/1999 and 1999/2000).

Variety	Storage period (days)	1998/1999			1999/2000		
		Weight loss (%)	Decay (%)	Firmness (pound/ inc ³)	Weight loss (%)	Decay (%)	Firmness (pound/ inc ³)
Galia	0	--	--	22.16	--	--	22.76
	7	1.42	--	20.29	2.02	--	20.89
	14	2.20	3.52	19.31	2.79	4.12	19.91
	21	5.60	4.79	17.32	6.26	5.39	17.92
	28	7.73	7.80	15.64	8.33	8.40	16.24
Total	0	--	--	15.97	--	--	16.57
	7	5.39	4.51	14.84	5.99	5.11	15.44
	14	7.18	11.69	13.65	7.78	12.29	14.25
	21	12.87	15.12	11.83	13.17	15.72	12.43
	28	14.29	21.56	9.94	14.89	22.16	10.54
Ideal	0	--	--	20.03	--	--	20.63
	7	3.65	--	18.24	4.25	--	18.84
	14	5.53	5.45	17.16	6.13	6.05	17.76
	21	9.30	7.59	14.94	9.90	8.19	15.54
	28	11.19	11.07	13.43	11.79	11.67	14.03
Galor	0	--	--	16.38	--	--	16.98
	7	5.23	--	14.46	5.83	--	15.06
	14	6.45	9.41	13.54	7.05	10.01	14.14
	21	11.14	14.19	11.64	11.74	14.79	12.24
	28	13.40	19.93	10.44	14.00	20.53	11.04
Vicar	0	--	--	21.30	--	--	21.90
	7	2.29	--	19.56	1.89	--	20.16
	14	3.49	4.17	18.44	4.09	4.77	19.04
	21	8.37	6.34	16.78	8.97	6.94	17.47
	28	10.33	10.31	15.92	10.93	10.91	16.52
Rafigal	0	--	--	23.61	--	--	24.21
	7	1.47	--	22.57	2.07	--	23.17
	14	2.72	3.53	21.51	3.32	4.13	22.11
	21	4.30	4.68	20.54	4.90	5.28	21.14
	28	6.23	8.22	19.42	6.83	8.82	20.02
Regal	0	--	--	22.60	--	--	23.20
	7	0.67	--	21.52	1.27	--	22.12
	14	2.23	3.24	20.41	2.83	3.84	21.01
	21	5.33	4.32	19.59	5.93	4.92	20.19
	28	7.24	7.71	18.45	7.84	8.31	19.05
Primal	0	--	--	24.32	--	--	24.90
	7	0.25	--	23.57	0.85	--	24.17
	14	1.42	1.72	22.61	2.02	2.32	23.21
	21	4.58	3.17	21.57	5.18	3.77	22.17
	28	6.42	6.37	20.54	7.02	6.97	21.14
L.S.D. at 0.05		0.12	--	0.33	0.11	--	0.32

A sharp elevation of ethylene content occurs during ripening of climacteric (Willis *et al.*, 1982), and this in turn decrease the firmness of the muskmelon fruits. The ethylene accumulation in fruits differ between varieties. Similar results were obtained by many workers Kasimire (1981), Evensen (1983), Ezzat (1991), and Abd El-Khalek (1996) on melon.

D. Chemical Composition :

1- Changes during storage :

It is noticed from data in Table (7) that, there were decreases in T.S.S., sugars and ascorbic acid contents with the prolongation of storage period.

Table (7) : Effect of storage period, variety and planting date on chemical composition of Cantaloupe fruits during storage.

1998/1999		1999/2000	
T.S.S. (%)	Total sugar (gm/100 gm edible portion)	Ascorbic acid (mg/100ml juice)	T.S.S. (%)
Total sugar (gm/100 gm edible portion)	Ascorbic acid (mg/100ml juice)	T.S.S. (%)	Total sugar (gm/100 gm edible portion)
14.43	9.37	22.46	15.03
14.29	9.28	21.12	14.89
14.11	9.17	20.01	14.71
13.89	9.02	18.89	14.49
13.43	8.72	17.13	14.03
0.06	0.04	0.26	0.04
Effect of storage period/days :			
0			
7			9.77
14			9.68
21			9.57
28			9.42
L.S.D. at 0.005			
Effect of variety :			
Galla	9.21	19.14	14.77
11.28	7.33	12.95	11.88
Total	9.97	24.64	15.94
Ideal	9.97	24.64	15.94
Galor	8.36	18.60	13.47
12.87	8.36	18.60	8.76
15.09	9.80	24.48	10.20
Vicar	9.54	17.24	9.94
14.69	9.54	17.24	9.94
Rafgali	9.39	21.07	9.79
14.46	9.34	21.22	9.74
Primal	0.36	0.38	0.34
14.37	0.02	0.38	0.04
L.S.D. at 0.05			
Effect of planting date :			
First	9.44	22.09	15.17
14.53	9.12	19.49	14.77
Second	8.79	18.16	14.13
13.53	8.79	18.16	9.19
Third	0.16	0.28	0.14
L.S.D. at 0.05			0.04

The decrease in T.S.S. and sugars during storage might be attributed to the increase in respiration rate and/or the conversion of sugars to other forms of carbohydrate compounds. Moreover, the decrease in vit. C might be due to the rapid rate of oxidation of pyruvic acid and other organic acids to CO₂. Similar results were obtained by Soliman (1980); Cohen and Hicks (1986); O'Hardenburg *et al.* (1986); Ezzat (1991) and Abd El-Khalek (1996) on melon.

2- Effect of variety :

Concerning the varietal differences in T.S.S., total sugars and ascorbic acid data show clearly that, fruits of Vicar and Ideal cvs were of

higher values than the other varieties under test. These results were true at the two growing seasons (Table 7). That could be attributed to heridital differences among varieties.

These results are in agreement with those reported by Pratt *et al.* (1977), Evensen (1983) and Abd El-Khalek (1996) on melon.

3- Effect of planting date :

Regarding the effect of fruit planting date on chemical properties, data in Table (7) showed clearly that T.S.S., total sugars and vit. C values reached the maximum amounts at the first planting date. These results hold true at the two seasons. That could be attributed to environmental factors which affected fruit quality at harvest (Locascio *et al.*, 1976).

4- Effect of interaction (variety X planting date) :

It is evident from data in Table (8) and Fig. (3) that, Vicar and Ideal cvs at planting dates exhibited the higher values of T.S.S. percent, total sugar and ascorbic acid compared to the other cultivars.

These results are in harmony with those obtained by Locascio *et al.* (1976) and Ezzat (1991) on melon.

Table (8) : Effect of interaction (variety X planting date) on chemical of Cantaloupe fruits during seasons (1998/1999 and 1999/2000).

Variety	Planting date	1998/1999			1999/2000		
		T.S.S. (%)	Total sugar (gm/ 100 gm edible portion)	Ascorbic acid (mg/100ml juice)	T.S.S. (%)	Total sugar (gm/ 100gm edible portion)	Ascorbic acid (mg/100ml juice)
Galia	First	14.65	9.52	21.22	15.15	9.92	21.82
	Second	14.26	9.26	18.70	14.86	9.66	19.30
	Third	13.62	8.85	17.50	14.22	9.25	18.10
Total	First	11.89	7.72	16.44	12.49	8.12	17.04
	Second	11.35	7.37	12.04	11.95	7.77	12.64
	Third	10.62	6.90	10.38	11.22	7.30	10.98
Ideal	First	15.88	10.32	26.00	16.48	10.72	26.60
	Second	15.35	9.97	24.50	15.95	10.37	25.10
	Third	14.81	9.62	23.42	15.41	10.02	24.02
Galor	First	13.28	8.63	21.04	13.88	9.03	21.64
	Second	12.92	8.39	18.46	13.52	8.79	19.06
	Third	12.43	8.07	16.30	13.03	8.47	16.90
Vicar	First	15.59	10.13	26.06	16.19	10.53	26.66
	Second	15.00	9.75	24.24	15.60	10.15	24.84
	Third	14.68	9.54	23.16	15.28	9.94	23.86
Rafigal	First	15.07	9.79	18.96	15.67	10.19	19.56
	Second	14.61	9.49	16.98	15.21	9.89	17.58
	Third	14.40	9.36	15.78	15.00	9.76	16.38
Regal	First	14.97	8.73	22.86	15.57	10.13	23.46
	Second	14.49	9.41	20.72	15.09	9.81	21.32
	Third	13.92	9.04	19.64	14.52	9.44	20.24
Primal	First	14.92	9.69	24.16	15.52	10.09	24.76
	Second	14.38	9.34	20.34	14.98	9.74	20.94
	Third	13.82	8.98	19.16	14.42	9.38	19.76
L.S.D. at 0.05		0.14	0.06	0.22	0.12	0.04	0.23

5- Effect of interaction (variety x storage period) :

Concerning the chemical composition, data in Table (9) show obviously that, there were significant and considerable decrease in T.S.S., total sugar and ascorbic acid values with the progress of storage period. However, Vicar and Ideal cvs during storage exhibited significantly higher T.S.S. percent, total sugar and vit. C values compared to other cultivars.

Similar results were reported by Ezzat (1991), Abd El-Khalek (1996) on melon.

Table (9): Effect of interaction (variety X storage period) on chemical composition of Cantaloupe fruits during seasons (1998/1999 and 1999/2000).

Variety	Storage period (days)	1998/1999			1999/2000		
		T.S.S. (%)	Total sugar (gm/ 100 gm edible portion)	Ascorbic acid (mg/100ml juice)	T.S.S. (%)	Total sugar (gm/ 100gm edible portion)	Ascorbic acid (mg/100ml juice)
Galia	0	14.71	9.56	22.20	15.31	9.95	22.80
	7	14.55	9.45	20.20	15.15	9.84	20.86
	14	14.21	9.23	19.06	14.81	9.63	19.66
	21	13.93	9.05	18.03	14.53	9.45	18.63
	28	13.46	8.74	16.20	14.06	9.14	16.80
Total	0	11.83	7.68	16.03	12.43	8.08	16.63
	7	11.63	7.55	14.03	12.23	7.95	14.63
	14	11.38	7.39	13.13	11.98	7.79	13.73
	21	11.11	7.22	11.70	11.71	7.62	12.30
	28	10.46	6.79	9.86	11.06	7.19	10.46
Ideal	0	15.70	10.20	26.66	16.30	10.60	27.26
	7	15.58	10.12	25.70	16.18	10.52	26.30
	14	15.45	10.04	24.73	16.05	10.44	25.33
	21	15.25	9.91	23.76	15.85	10.31	24.36
	28	14.75	9.55	22.43	15.35	9.95	23.03
Galor	0	13.41	8.91	20.96	14.01	9.11	21.56
	7	13.21	8.85	19.63	13.81	8.98	20.23
	14	12.93	8.43	18.78	13.58	8.83	19.38
	21	12.68	8.24	17.66	13.28	8.64	18.26
	28	12.08	7.85	16.26	12.68	8.25	16.86
Vicar	0	15.42	10.02	26.80	16.02	10.42	27.40
	7	15.30	9.94	25.63	15.90	10.34	26.23
	14	15.20	9.82	24.56	15.80	10.28	25.16
	21	15.00	9.75	23.73	15.60	10.15	24.33
	28	14.53	9.44	21.70	15.13	9.84	22.30
Rafigal	0	14.95	9.71	19.93	15.55	10.11	20.53
	7	14.85	9.65	18.70	15.45	10.05	19.30
	14	14.71	9.56	17.70	15.31	9.96	18.30
	21	14.53	9.44	15.90	15.13	9.84	16.50
	28	14.41	9.36	13.96	15.01	9.76	14.56
Regal	0	14.76	9.82	23.73	15.36	10.14	24.33
	7	14.66	9.74	22.76	15.26	9.99	23.36
	14	14.53	9.44	20.66	15.13	9.84	21.26
	21	14.36	9.34	20.06	14.96	9.73	20.66
	28	13.96	9.07	18.13	14.56	9.47	18.73
Primal	0	14.70	9.55	23.43	15.30	9.95	24.03
	7	14.60	9.49	22.36	15.20	9.89	22.96
	14	14.45	9.39	21.50	15.05	9.79	22.10
	21	14.26	9.26	20.33	14.86	9.66	20.93
	28	13.85	9.00	18.46	14.45	9.40	19.06
L.S.D. at 0.05		0.03	0.02	0.16	0.02	0.04	0.24

REFERENCES

- Abd El-Khalek, M.A. (1996). Effect of some culture on productivity and storage of some Cantaloupe cultivars. M.Sc. Thesis, Fac. Agric., Cairo Univ., A.R.E.
- Association of Official Agricultural Chemists (1960). Official Method of Analysis A.O.A.C., Washington 4, D.C., U.S.A.
- Bigalke, M. and S. Huyskens-Keil (2001). Influence of different postharvest treatments on quality and shelf life of Cantaloupe-melons cv. Galia transported by airfreight. *Horti. Abstr.*, 71(1):448.
- Cohen, R.A. and J.R. Hicks (1986). Effect of storage on quality and sugars in muskmelon. *J. Amer. Soc. Hort. Sci.*, 111(4): 553-557.
- El-Deweny, H.H. (1978). Evaluation of some varieties of sweet melon and muskmelon. M.Sc. Thesis, Fac. Agric., Ain Shams Univ., A.R.E.
- Evensen, K.B. (1983). Effect of maturity at harvest, storage temperature, and cultivars on muskmelon quality. *Hort. Sci.*, 18(6): 907-908.
- Ezzat, M.A. (1991). Physiological studies on storage and ripening of some Cantaloupe cultivars. Ph.D. Thesis, Fac. Agric. Zagazig Univ., A.R.E.
- Hamail, A.F. and M.M. Abd El-Rahman (1992). Evaluation of some cucumber varieties under two location. *J. Agric. Sci. Mansoura Univ.*, 17(7): 2420-2427.
- Hordunburg, R.E.; C. Wated and C.Y. Wang (1986). The Commercial Storage of Fruits, Vegetables, Florist and Nursery Stock. U.S. Dept., Agric., Handbook, No. 66.
- Ibarra, L.; I. Flores and J.C. Draz-Pérez (2001). Growth and yield of muskmelon in response to plastic mulch and row covers. *Hort. Abstr.* 71(7): 5849.
- Kasmire, R.F. (1981). Quality characteristics, harvesting and post-harvest operations of muskmelon in California. Division Agric. Sci. Co-Operation, Extension, U.S. Dept. of Agric., Univ. of California, U.S.A.
- Li Xiu Xiu; Duan, AiMin; Lu Jing, Gang (*et al.*) (2001). A new muskmelon F₁ hybrid. *Hort. Abstr.*, 71(2): 7677.
- Locascio, S.J.; G.W. Elmstrom; R.K. Showatter and D.J. Cantliffe (1976). Effect of locations, cultivars, irrigation and temperature on water-soaking and seed quality in watermelon fruits. *Proc. Fla. State Hort. Sci.*, 89: 97-100.
- Pratt, H.K.; J.D. Goeschi and F.W. Martin (1977). Fruit growth and development, ripening and the role of ethylene in the Honey Dew muskmelon. *J. Amer. Soc. Hort. Sci.*, 102(2): 203-210.
- Rizkalla, W.R.; M.A. Ragab and S.A. Bahaa El-Din (1987). Performance of some cucumber cultivars evaluated during summer and fall plantings 12th. International Congress for Statistics, Computer Science, Social and Demographic Research, Ain Shams Univ., 97-83.
- Ryall, A.L. and W.J. Lipton (1979). Handling, transportation and storage of fruits and vegetables, Vol. 1, 2nd Ed. Vegetables and Melons. AVI publishing Co., INC. Westport, Connecticut, U.S.A.
- Shaffer, P.A. and A.P. Hartman (1921). The iodometric determination of copper and its use in sugar analysis. *J. Biol. Chem.*, 45: 365.

Snedecor, G.W. and W.G. Cochran (1971). Statistical Methods. Iowa State Univ. Press, Iowa, U.S.A.

Stanley, J.K. (1991). Post-harvest Physiology of Perishable Plant Products. Inc. Van Nostrand Reinhold, New York, U.S.A.

Wills, R.B.H.; T.H. Lee; D. Grahm; W.B. McGlassom and E.G. Hall (1982). Postharvest. An Introduction to Physiology and Handling of Fruits and Vegetables. Inc. Westport, Connecticut.

تأثير الصنف وميعاد الزراعة على القدرة الإنتاجية ومواصفات الثمار والقدرة التخزينية لبعض أصناف الكنتالوب تحت ظروف صعيد مصر

محسن عبدالمقصود عزت

معهد بحوث البساتين - مركز البحوث الزراعية - وزارة الزراعة

أجريت هذه الدراسة على ثمانية أصناف من الكنتالوب (جاليا - توتال - إيديال - جالور - فيكار - رافيجال - ريجال - بريمال) بهدف دراسة تأثير الصنف وميعاد الزراعة على القدرة الإنتاجية ومواصفات الثمار والقدرة التخزينية. زرعت هذه الأصناف في مدينة إسنا محافظة قنا أثناء العروة النيلية والعروة الشتوية لعامي ١٩٩٨/١٩٩٩ ، ١٩٩٩/٢٠٠٠.

ويمكن تلخيص أهم النتائج فيما يلي :-

١. تفوق المحصول المبكر لأصناف رافيجال وبريمال وجاليا والمنزرعة في الميعاد الأول (العروة النيلية) عن باقي الأصناف . ومن ناحية أخرى أعطت بعض الأصناف مثل توتال وجالور أقل محصول للعامين . زيادة على ذلك تفوق الميعاد الأول عن الميعادين الآخرين في كل من العامين .
٢. تفوق المحصول الكلي لأصناف رافيجال وجاليا وإيديال والمنزرعة في الميعاد الأول بينما أعطت الأصناف ريجال وجالور وتوتال أقل محصول .
٣. تفوق الميعاد الأول في المحصول الصالح للتصدير عن المواعيد الأخرى . وعلى أي حال تفوقت الأصناف رافيجال وجاليا وبريمال والمنزرعة في الميعاد الأول عن الأصناف ريجال وتوتال وإيديال في المحصول الصالح للتصدير في كل من العامين .
٤. تفوقت الأصناف رافيجال وجاليا وتوتال وإيديال وجالور والمنزرعة في الميعاد الأول عن الأصناف بريمال وريجال في متوسط وزن الثمرة .
٥. تفوقت الأصناف إيديال وتوتال وريجال وبريمال والمنزرعة في الميعاد الأول بالإشارة إلى متوسط وزن الثمرة الصالحة للتصدير .
٦. بالإشارة إلى شكل الثمرة تفوقت أصناف رافيجال وفكار وإيديال وبريمال في هذا الصدد عن الأصناف ريجال وجالور وتوتال وجاليا .
٧. بالإشارة إلى المحتوى من المواد الصلبة الزائدة تفوقت أصناف فيكار وإيديال ورافيجال والمنزرعة في الميعاد الأول في المحتوى من المواد الصلبة الزائدة ، بينما أعطت أصناف ريجال وجاليا وجالور وتوتال أقل قيمة بالتوالي .
٨. بالإشارة إلى صلابة الثمار تفوقت أصناف بريمال ورافيجال وريجال وجاليا في صلابة الثمار بينما أعطت أصناف فيكار وإيديال وجالور أقل قيمة بالتوالي .
٩. عموماً ثمار الكنتالوب المنزرعة في الميعاد الأول تفوقت في صلابتها عن المواعيد الأخرى في كل من العامين .
١٠. بالنسبة للقدرة التخزينية زادت قيمة نسبة الفقد في الوزن والتالف بزيادة مدة التخزين ، علاوة على ذلك قلت قيمة صلابة الثمار بزيادة مدة التخزين .
١١. أظهرت ثمار أصناف ريجال ورافيجال أقل قيمة في نسبة الفقد في الوزن والتالف بالمقارنة بأصناف توتال وجالور الذي أعطى أكبر قيمة في هذا الصدد .
١٢. أظهرت ثمار أصناف بريمال وريجال ورافيجال أعلى قيمة في الصلابة ويليه أصناف جاليا وفكار وإيديال بينما أظهرت أصناف توتال وجالور أقل قيمة في الصلابة .
١٣. عموماً أظهرت ثمار الكنتالوب والمنزرعة في الميعاد الأول تفوقاً معنوياً في أقل قيمة في نسبة الفقد في الوزن والتالف وأعلى قيمة في الصلابة في الميعاد الثاني أو الميعاد الثالث .
١٤. وبالإشارة إلى المكونات المكونة الكيماوية زادت قيمة الفقد في كل من المواد الصلبة الذاتية والسكريات الكلية والمحتوى من حمض الأسكوربيك بزيادة مدة التخزين .
١٥. عموماً أظهرت النتائج في كل من الصنفين فيكار وإيديال تفوقاً في هذا الصدد عن باقي الأصناف تحت الدراسة . ومن ناحية أخرى وصلت أعلى قيمة في محتوى الثمار من المواد الصلبة الزائدة والسكريات وفيتامين ج المنزرعة في الميعاد الأول .