EFFECT OF POSTHARVEST ETHREL TREATMENTS ON RIPENING AND STORAGEABILITY OF SOME NETTED AND UNNETTED CANTALOUPE VARIETIES

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ABSTRACT

This study included 4 cantaloupe varieties (2 Unnetted i.e. Honey Dew and Charentais and 2 netted i.e. Primal and Total) and 3 ethrel concentrations (0.0, 500, and 1000ppm). Fruits were dipped in ethrel solution after harvest then stored under cold storage. Results were recorded changes in physical and chemical composition in fruits during storage i.e. weight loss, decay, firmness, T.S.S., total sugars, and Vit.C.

Regarding the weight loss and decay percent exhibited significant and increase at cold storage for 28 days, while there were significant and gradual decrease in firmness values. However, Honey Dew cv. exhibited the least in weight loss percent compared with the other cultivars, while Charentais cv. showed the least in decay percent. Moreover, Honey Dew and Charentais cvs. Showed the highest values of firmness compared with Primal and Total cvs. On the other hand, treated fruits with 500 . 1000ppm with ethrel exhibited higher values in weight loss and decay percent and lower firmness values compared with those untreated.

Concerning chemical composition, all these constituents (TSS, Total sugar, and Vit.C.) decreased with the prolongation of storage period. Primal cv. exhibited the highest values of TSS, total sugars, and ascorbic acid compared to the other varieties under test.

Moreover, postharvest dipping in ethrel at 1000ppm enhanced fruit ripening senescence in Primal and Total cvs. by reducing TSS, total sugars and Vit.C. Whereas such treatments with Honey Dew and Charentais cvs. enhanced fruit ripening and reaching to the edibility.

INTRODUCTION

The shelf life of cantaloupe fruits is different from variety to another. It was affected by many factors such as variety, maturity stage, storage temperature and postharvest treatments (Waxing, treating with ethrel…etc.). The fruits of unnetted varieties (HoneyDew and Charentais) are harvested by cutting from the vine and are difficult to choose by appearance alone, for they show little superficial change as they mature in the field. These varieties will not ripe if left attached to plant and even after harvest artificial ripening is needed for the fruits to attain optimum eating quality by using artificially ripen (ethrel) as stated by Ryall and Lipton (1979) on melon. In tissues, which can produce ethylene, the experience of exposure to some ethylene may cause an avalanche of ethylene production like an autocatalytic response. The autocatalytic effect of ethylene on its own production is evident in the ethylene triggering of climacteric fruit ripening (Burg and Burg, 1962).

The effect of ethrel treatments on melon fruits during storage were studied by many investigators such as Kasmire *et al*. (1970); Yamaguchi *et al* (1977), Kasmire (1981) and Ezzat (1991) on melon. Moreover, the changes occurred in chemical composition of fruits during storage were studied by

Soliman (1980); Cohen and Hicks (1986) and Ezzat (1991). In the meantime these changes were found to be affected by variety (Evensen, 1983 and Ezzat, 1991).

Therefore the aim of this study was to investigate the effect of ethrel postharvest dipping treatments on the changes physical and chemical composition of fruits during storage and their storageability.

MATERIALS AND METHODS

Two field trials were carried out on cantaloupe varieties at El – Wakeel Farm (El – Sadat City – Monofia Governorate) during the winter seasons of 1998 /1999 and 1999 /2000.

This experiment consisted of 12 treatments, resulted from the combination of four cantaloupe varieties X 3 ethrel concentrations.

Cantaloupe varieties used in this experiment were Primal; Total (netted varieties) and HoneyDew green flesh and Charentais (unnetted varieties). Maturity stage was at 45 days after anthesis. Ethrel concentrations used were 0, 500 and 1000ppm.

The treatments were tested in a split–plot design with four replications, of main plots devoted for cultivars while, ethrel treatments in sub–plots. Cantaloupe seeds were sown on December 15th in the two seasons under polyethylene tunnels. Flowers were labeled just after anthesis. Normal cultural practices were followed according to Ministry of Agriculture recommendations. Labeled fruits were picked at the stage of maturity as previously indicated. The fruits after harvesting were dipped in ethrel solutions at 0.0, 500, or 1000ppm concentrations for 5 minutes, then dried and kept in carton boxes lining with craft paper in order to store them. Storage was done under cold room conditions (2.5^{o}C + 95 % R.H.)

Experimental data recorded:

During storage, samples were taken from stored fruits to determine the changes occurred in the physical and chemical constituents at 7 days intervals, starting at the beginning of storage.

The following data were recorded:

1- **Weight loss:** according to the equation

$$\text{Percent loss in weight} = \frac{\text{Initial weight} - \text{weight of fruits at sample}}{\text{Initial weight of fruit}}$$

2- **Decay percent:** Any fruit showing decay incidence was counted and related to the number of total fruits.

$$\text{Decay percentage} = \frac{\text{Number of decayed fruits}}{\text{Total number}} \times 100$$

3- **Firmness:** Firmness of the fruits were measured in pounds / square inch using the pressure tester (Model Magness Tailur) equipped with 6/17 inch plunger and caliberated to measure the number of pounds per square inch required to force the plunger into the fruit.

4- **Total Soluble Solids content:** TSS was recorded by hand refractometer on sections taken from the central axis of the fruit (Wills *et al*., 1982).

5- **Total sugar contents:** Total sugars in the flesh, a sample of 15 gram equally taken from both ends and middle of the fruit. The modified method of Shaffer and Hartman (1921) was adapted.

6- **Vitamin C:** Ascorbic acid was determined in the juice by the titration method using 2,6 dichlorophenol endophenol (A.O.A.C. 1960).

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

RESULTS AND DISCUSSION

A- Keeping quality:

1- Change during storage:

Regarding the weight loss and decay percent, data in Table (1) and Fig.1.(a) show obviously that there were significant and considerable increases at cold storage for 28 days.

Concerning fruit firmness, data indicated a significant and gradual decrease in firmness values when stored under cold storage.

The results could be explained by that internal ethylene concentration of melon rises from pre–climatric to climatric level that it affects the ripening process as firmness to ripen. Therefore, melons can be reading ripened with ethylene even when immature. Besides, the higher rate of respiration and other biochemical changes occurring after harvest which lead to senescence. However, cold storage retarded the softening value of the fruit because it delayed ethylene formation and accumulation.

These results agreed with those obtained by Soliman (1980); Evensen (1983) and Ezzat (1991) on melon.

2- Effect of variety:

Data are presented in Table (1) and Fig.1 (b). Regarding the weight loss and decay percent HoneyDew Cultivar exhibited the least in weight loss percent compared with the other cultivars, while Charentais cv. showed the least in decay percent.

These results could be due to the thickness of skin, flesh and natural wax, which prevents the loss in water evaporation, less respiration and later in pectin's solubility.

Concerning the firmness value, data shows clearly that Honey Dew and Charentais cultivars exhibited the highest values of firmness compared with Primal and Total cvs.

These results might due to the varietal differences in activity of enzymes as pectinase; decarboxylases, ethylene accumulation, waxing layer and this in turn affect the ripening processes of fruit as firmness.

These results agreed with those obtained by Ezzat (1991) on melon.

table1

fig1-a

fig1-b

Effect of postharvest treatments with ethrel:

With respect to weight loss and decay percent, data in Table (1) and Fig.1 (c) show that treated fruits with 500 or 1000ppm with ethrel exhibited higher values compared with those of untreated ones. However, there were differences between the two treatments in this respect.

These results could be due to that treating fruits with ethylene lead to rise its internal concentration of ethylene from the preclimactric to climateric level at which the fruit commences to ripen. Therefore, melons can be readily ripened with ethylene even when immature. Besides, the higher rate of respiration and other biochemical changes occurring after harvest which lead to senescence followed Van't Haff rule of doubling or trebling processes for each rise in temperature of 10^{o}C. Therefore cold storage retarded the appearance of decay.

Regarding the effect of treatment on firmness data in Table (1) indicated that fruits treated with ethrel either at 500 or 100ppm as dipping treatments showed significantly lower firmness values compared with those untreated.

These results might be due to that ethylene act as a ripening hormone as reported by Kasmire (1981) on muskmelon and Ezzat (1991) on melon.

3- Effect of interaction between varieties and post harvest treatments with ethrel

Such data in Table (2) and Fig.2. show that, there were significant differences between varieties in weight loss percent at different treatments. However, the fruits treated with ethrel at in 500 or 1000ppm exhibited significantly higher weight loss percent than untreated in all varieties under test.

On the other hand, data in Table (2) and Fig.2. reveal that, there were differences in decay percent between varieties of different treatments kept under cold storage.

However, the fruits treated with 500 or 1000ppm ethrel exhibited higher decay percent than untreated.

Data in Table (2) and Fig.2. indicated that there were significant differences between untreated fruits and treated with 500 or 1000ppm ethrel in firmness values in all varieties. Moreover, the highest firmness value exhibited at untreated fruits followed by 500 and 1000ppm ethrel treatments in all varieties kept under cold storage.

B. Chemical composition

1. Changing during storage

With regard to the effect of storage period on TSS, total sugar and Vitamin C, it is noticed from data presented in Table (3) and Fig.3(a). that, were slight decrease at the beginning of storage period, then more decrease were observed with the prolongation of storage period. Similar results were reported by Soliman (1980), Cohen and Hicks (1986) and Ezzat (1991) on melon.

fig1-c

table2

fig2

table3

fig3 -a

2. Effect of variety:

Data presented in Table (3) and Fig.3(b). revealed also that, there were significant in T.S.S., total sugars and ascorbic acid of different used varieties under cold storage. Moreover, Primal variety exhibited the highest values of T.S.S., total sugar and ascorbic acid compared to the other varieties under test.

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

3. Effect of postharvest treatments with ethrel:

With regard to the effect of ethrel treatment on TSS, Total sugar, data presented in Table (3) and Fig.3(c). show obviously that there were significant differences between control and dipping in 500 or 1000ppm ethrel. However, ethrel at 500 or 1000ppm exhibited lower values of TSS percent, total sugar and ascorbic acid compared with untreated fruits.

The decrement in TSS percent or total sugar at different treatments could be due to that treating fruits with ethrel led to rise its internal ethylene concentrations from preclimacteric to climacteric level at which the fruit commences to ripen. Therefore, melons can be readily ripened with ethylene even when immature.

These results agreed with those obtained by Kasmire on muskmelon (1981) and Ezzat (1991) on melon.

On the other hand, the decrement in ascorbic acid at different treatments could be explained in the light of ethylene act as a ripening hormone. In the meantime higher respiration rate and other biochemical changes coincide with climacteric rise after which there is a decline in chemical compounds which leads to senescence, as stated by Ryall and Lipton (1979) and Wills et al. (1982).

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

4. Effect of interaction between varieties and postharvest treatments with ethrel:

Data in Table (4) and Fig.4. clearly show that, there were significant differences between varieties in all chemical properties in fruits at different treatments kept under cold storage. The same data indicated that, significant differences detected between 500 and 1000ppm ethrel treatments in all the studied chemical compositions in all varieties. However, treated fruits with 1000ppm ethrel exhibited lower TSS percent, total sugar and Vit.C. content values than untreated one. Moreover, Primal variety surpassed all varieties in TSS, total sugar, and ascorbic acid at different treatments under cold storage.

These results could be due to that applying ethylene initiates the ripening of climacteric fruits (HoneyDew and Charentais fruits) Wills et al. (1982) stated that internal ethylene concentration rise from the preclimacteric level of 0.04 microlitre/litre to 3.0 microlitre/litre at which concentration commences the fruit to ripen. They added that fruits were classified to different classes concerning the concentration of ethylene at which fruits ripen.

fig3-b

fig3-c

table4

fig4

The varieties (HoneyDew and Charentais) require arise in the concentration of internal level of ethylene from 0.04 to 3.0 micro–liter/ liter to initiate ripening is artificially applied, there is a rise in the internal level and enhancing the ripening and edibility of the fruits. In the meantime Primal and Total fruits, normally produce ethylene in a greater concentration which leads to normal ripening. However, artificially applied ethylene results in enhancement of ripening and lead to senescence of the fruits.

From the forgoing information results in (Table 1, 2, 3, 4, 5), it could be suggested that the use of ethylene to enhance fruit ripening and ripening uniformity is thoroughly documented. However, it is used commercially to promote faster and more uniform ripening in cantaloupe, HoneyDew and Charentais melons with a concentration of 1000 ppm and an exposure duration of 24–48 hours. The optimum temperature for fruit ripening between 20 to 25^{o}C (Cantwell, 1996; Kader 1979; Suslow et al., 1997). After the required period of cold storage, ethylene can be used not only to enhance ripening of ripe – consumed melons but also to ensure ripening uniformity (Primal and Total cvs).

5. Effect of interaction between varieties and storage period:

Data presented in Table (5) and Fig.5.(a) show general trend, that prolongation of storage period led to reduction in firmness and all chemical properties i.e. T.S.S. total sugar and Vit.C content and also deterioration of fruits expressed as an increase in weight loss % and in percentage of decayed fruits for the different cultivars under study.

The physical character, i.e. weight loss % decay % and firmness showed gradual deterioration with prolongation of storage period. This reduction in fruit quality became significant after 7 days. The percentage of occurrence of such trend significantly differs in between cultivars as follows, Total cultivar showed the highest percentage in the occurrence of the general physical characters trend observed with lower fruit characteristics, i.e. 16.32% weight loss, 14.46%decay % and 14.66 pound/inch^2 firmness (average two seasons).

However, HoneyDew and charentais cvs. exhibited the lowerest percentage in the occurrence of the general trend observed with higher fruit characteristics, i.e. 7.35 and 9.23 weight loss %, 12.71 and 10.36 decay % and 20.33 and 20.03 pound/inch^2 firmness (average two seasons) for HoneyDew and charentais respectively at the end of storage period (28days) under cold storage condition.

On the contrary, Primal (ranked third in physical properties) being the first in T.S.S. and total sugar and Vit.C content followed by Total, HoneyDew ranked third and then Charentais ranked fourth.

table5

fig5-a

fig5-b

Chemical properties of cantaloupe fruits stored under cold storage at 2.5C^0 showed gradual reduction through storage period. This reduction became significant in T.S.S. % and in both total sugar and Vit.C after 7 days based on cultivar.

These results might be due to evaporation respiration and hereditary differences among the cultivars. Moreover, increasing the storage period may result in increasing the duration through which the pectin estrase perform and this may lead to increase the soluble form of pectin substances, as stated by Wills et al. (1982).

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تأثير المعاملة بالايثيريل بعد الحصاد على النضج والقدرة التخزينية لثمار بعض أصناف الكنتالوب الشبكية والملساء

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مركز البحوث الزراعية – معهد بحوث البساتين

اشتملت هذه الدراسة على أربعة أصناف كنتالوب (صنفين ملساء مثل هنى ديو وشرنيتز وصنفين من الأصناف الشبكية مثل بريمال وتوتال) ، ٣ تركيزات من الايثيريل (صفر ، ٥٠٠، ١٠٠٠، جزء فى المليون) حيث غمست الثمار بعد قطفها فى محلول الايثيريل بالتركيزات السابقة وخزنت بعد ذلك فى ظروف مبردة. وسجلت التغيرات الحادثة فى كل من الصفات الطبيعية للثمار (فقد الوزن ، والتالف ، والصلابة) والكيماوية (المواد الصلبة الذائبة الكلية ، السكريات الكلية ، وفيتامين ج) أثناء التخزين ، وأوضحت النتائج ما يلى :

- زادت معدل الفقد فى كل من الوزن والتالف بزيادة طول مدة التخزين بينما انخفضت الصلابة للثمار.
- أعطت ثمار الصنف هنى ديو اقل فقدا فى الوزن بينما أوضح الصنف شرنيتز اقل فقدا فى التالف.
- أظهرت ثمار صنفى هنى ديو وشرنتيز اعلى قيم فى الصلابة بالمقارنة لصنفى بريمال وتوتال.
- أدى غمس الثمار بمحلول الايثيريل بتركيز ٥٠٠، ١٠٠٠ جزء فى المليون إلى زيادة معدل الفقد فى الوزن والتالف وتقليل صلابة الثمار بالمقارنة لغير المعاملة.
- أظهرت المكونات الكيماوية (المواد الصلبة الذائبة الكلية ، والسكريات الكلية ، وفيتامين ج) انخفاضاً كبيراً فى الثمار بزيادة طول مدة التخزين.
- اظهر صنف بريمال اعلى قيمة فى كل من المحتوى للمواد الصلبة الذائبة الكلية ، والسكريات الكلية وفيتامين ج بالمقارنة لباقى الأصناف
- أدى غمس ثمار صنفى بريمال وتوتال فى محلول الايثيريل ١٠٠٠ جزء فى المليون إلى إسراع النضج والشيخوخة حيث أدى إلى خفض كل من المواد الصلبة الذائبة والسكريات الكلية وفيتامين ج بينما أدت هذه المعاملة آدت إلى الإسراع فى النضج ووصول الثمار إلى حالة صالحة للأكل وليس إلى الشيخوخة للأصناف هنديو و شرنتيز.

Table (1): Effect of storage period, varieties and post-harvest treatments with ethrel on physical properties of cantaloupe fruits during storage.

	1998/1999			1999/2000		
	Weight loss (%)	**Decay (%)**	**Firmness (pound/inch^2)**	**Weight loss (%)**	**Decay (%)**	**Firmness (pound/inch^2)**
Effect of storage period/days:						
0	-	-	24.45	-	-	25.12
7	2.73	-	22.56	3.58	-	23.15
14	4.33	5.32	21.36	4.94	5.92	21.96
21	8.02	7.05	19.71	8.62	7.89	20.31
28	11.04	11.67	17.59	11.64	12.56	18.35
LSD at 0.05	0.23	-	0.37	0.25	-	0.41
Effect of variety:						
Primal	7.51	7.61	20.06	8.11	8.20	20.58
Honey Dew	3.65	8.43	23.60	4.25	9.42	23.84
Charentais	4.78	6.30	22.88	5.38	6.90	23.39
Total	10.15	10.03	17.97	10.75	10.63	18.78
LSD at 0.05	0.19	-	0.28	0.21	-	0.39
Effect of Ethrel : (ppm)						
Control	5.27	6.13	21.52	5.87	6.72	22.37
Dip.500	6.85	8.77	21.19	7.45	9.37	21.72
Dip.1000	7.45	9.37	20.45	8.05	9.98	20.85
LSD at 0.05	0.12	-	0.17	0.11	-	0.19

Table (3): Effect of storage period, variety and post-harvest treatment with ethrel on chemical composition of cantaloupe fruits during storage.

	1998/1999			1999/2000		
	TSS (%)	**Total sugar gm/100gm edible portion**	**Ascorbic acid (mg / 100ml Juice)**	**TSS (%)**	**Total sugar gm/100gm edible portion**	**Ascorbic acid (mg / 100ml Juice)**
Effect of storage period/days:						
0	12.60	8.18	19.07	13.20	8.58	19.67
7	12.39	8.06	17.71	12.99	8.45	18.31
14	12.19	7.92	16.78	12.79	8.32	17.38
21	11.99	7.74	16.01	12.59	8.14	16.61
28	11.63	7.57	14.08	12.25	7.97	14.68
LSD at 0.05	0.04	0.03	0.14	0.06	0.05	0.16
Effect of variety:						
Primal	14.18	9.17	22.18	14.78	9.57	22.78
Honey Dew	11.13	7.23	15.22	11.73	7.63	15.82
Charentais	11.49	7.47	13.91	12.09	7.87	14.51
Total	11.84	7.69	15.60	12.44	8.09	16.20
LSD at 0.05	0.05	0.03	0.18	0.07	0.05	0.19
Effect of Ethrel : (ppm)						
control	12.27	7.97	17.10	12.87	8.38	17.70
Dip.500	12.17	7.91	16.69	12.77	8.31	17.29
Dip.1000	12.04	7.80	16.41	12.64	8.20	17.01
LSD at 0.05	0.04	0.02	0.10	0.05	0.04	0.14

Table (4): Effect of interaction between varieties and post-harvest treatments with ethrel on chemical composition of cantaloupe fruits.

Variety	Treatment	1998/1999			1999/2000		
		TSS (%)	Total sugar gm/100gm edible portion	Ascorbic acid (mg / 100ml Juice)	TSS (%)	Total sugar g/100gm edible portion	Ascorbic acid (mg / 100ml Juice)
Primal	control	14.31	9.29	22.52	14.91	9.70	23.12
	Dip.500	14.19	9.22	22.16	14.79	9.62	22.76
	Dip.1000	14.05	9.03	21.88	14.65	9.43	22.48
Honey Dew	control	11.24	7.30	15.69	11.84	7.70	16.29
	Dip.500	11.13	7.23	15.10	11.73	7.63	15.70
	Dip.1000	11.04	7.17	14.89	11.64	7.57	15.49
Charentais	control	11.66	7.57	14.22	12.26	7.97	14.82
	Dip.500	11.54	7.49	13.90	12.14	7.89	14.50
	Dip.1000	11.33	7.36	13.62	11.93	7.76	14.22
Total	control	11.88	7.74	15.97	12.48	8.14	16.57
	Dip.500	11.84	7.69	15.61	12.44	8.09	16.21
	Dip.1000	11.76	7.64	15.25	12.36	8.04	15.85

Table (5): Effect of interaction between varieties and storage periods on keeping quality and chemical composition of cantaloupe fruits.

Variety	Character Storage period (days)	1998/1999						1999/2000					
		Weight loss (%)	Decay (%)	Firmness (pound/ inch^2)	TSS (%)	Total sugar gm/100gm edible portion	Ascorbic acid (mg / 100ml Juice)	Weight loss (%)	Decay (%)	Firmness (pound/ inch^2)	TSS. (%)	Total sugar gm/100gm edible portion	Ascorbic acid (mg / 100ml Juice)
Primal	0	-	-	23.75	14.70	9.55	24.60	-	-	24.35	15.30	9.94	25.20
	7	3.69	-	21.03	14.50	9.42	23.13	4.29	-	21.63	15.10	9.83	23.75
	14	5.41	5.36	19.83	14.16	9.21	22.36	6.01	5.96	20.43	14.76	9.61	22.96
	21	8.76	6.36	18.93	13.96	8.90	21.20	9.36	6.96	19.53	14.56	9.30	21.80
	28	12.17	10.12	16.76	13.58	8.83	19.63	12.77	11.72	17.36	14.18	9.23	20.23
Honey Dew	0	-	-	26.50	11.60	7.54	17.35	-	-	27.40	12.20	7.94	17.95
	7	1.25	-	25.03	11.41	7.42	16.18	2.85	-	25.63	12.01	7.82	16.78
	14	1.84	5.71	24.13	11.15	7.24	15.41	2.44	6.31	24.73	11.75	7.64	16.01
	21	4.40	7.26	22.33	10.95	7.11	14.40	5.00	8.86	22.93	11.55	7.51	15.00
	28	7.05	12.33	20.03	10.56	6.86	12.80	7.65	13.09	20.63	11.16	7.26	13.40
Charentais	0	-	-	25.70	11.90	7.73	16.20	-	-	26.30	12.50	8.13	16.80
	7	1.96	-	24.83	11.68	7.59	14.83	2.56	-	25.43	12.28	7.99	15.43
	14	2.38	3.23	23.23	11.55	7.50	13.90	2.98	3.83	23.83	12.15	7.90	14.50
	21	6.01	5.61	21.43	11.35	7.37	13.43	6.61	6.21	22.03	11.95	7.77	14.03
	28	8.93	10.06	19.23	10.98	7.19	11.20	9.53	10.66	20.83	11.66	7.59	11.80
Total	0	-	-	21.85	12.20	7.93	18.15	-	-	22.45	12.80	8.33	18.75
	7	4.02	-	19.33	12.00	7.79	16.73	4.62	-	19.93	12.60	8.19	17.33
	14	7.71	6.98	18.23	11.90	7.73	15.46	8.31	7.58	18.83	12.50	8.13	16.06
	21	12.91	8.96	16.13	11.70	7.60	15.00	13.51	9.56	16.73	12.30	8.00	15.60
	28	16.02	14.16	14.36	11.40	7.41	12.70	16.62	14.76	14.96	12.00	7.81	13.30
L.S.D. at 0.05		0.16	-	0.21	0.11	0.04	0.13	0.14	-	0.24	0.13	0.02	0.14

Table (2): Effect of interaction between varieties and post-harvest treatment with ethrel) on physical properties of cantaloupe fruits.

Variety	Treatment	1998/1999			1999/2000		
		Weight loss (%)	Decay (%)	Firmness (pound/inch^2)	Weight loss (%)	Decay (%)	Firmness (pound/inch^2)
Primal	control	6.25	6.52	20.45	6.84	7.12	21.05
	Dip.500	7.85	7.86	20.11	8.45	8.46	20.65
	Dip.1000	8.45	8.46	19.63	9.05	9.06	20.05
Honey Dew	control	2.45	3.96	24.04	3.05	4.53	24.64
	Dip.500	3.95	10.37	23.66	4.55	10.97	24.24
	Dip.1000	4.55	10.97	22.18	5.15	11.57	22.64
Charentais	control	3.52	5.28	23.26	4.12	5.88	23.86
	Dip.500	5.12	6.51	22.94	5.72	7.11	23.46
	Dip.1000	5.72	7.11	22.46	6.32	7.71	22.86
Total	control	8.89	8.77	18.35	9.49	9.37	18.55
	Dip.500	10.49	10.37	18.03	11.09	10.97	17.85
	Dip.1000	11.09	10.97	17.55	11.69	11.57	18.78
LSD at 0.05		0.12	-	0.14	0.11	-	0.10