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PRE AND POST HARVEST TREATMENTS ON PEACH FRUITS GROWN UNDER DESERT CONDITIONS

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ABSTRACT

The present study was carried out during the three successive seasons of 2003, 2004 and 2005 (the first season was a preliminary experimental season to select the best concentration of each material under study)on Desert Red peach fruits to evaluate the effect of Calcium chloride ($CaCl_2$), Gibberellic acid (GA_3), Potassium permanganate ($KMnO_4$) and Camphor oil as pre-harvest treatments on fruit quality , storage ability under 30 days of cold storage at 2°C ± and during marketing, for 2 days at room temperature after cold storage.

The data revealed that, spraying peach trees two weeks before harvest with Camphor oil at 0.1% was very safety , effective for reducing decayed fruits and total loss in fruit weight at cold storage and during marketing under room temperature. In addition to keeping fruit quality ,progress fruit firmness and anthocyanin content.

Moreover, $CaCl_2$ at 1 % + $KMnO_4$at 0.1% enhanced fruit firmness, the content of anthocyanin and reduced loss in fruit weight. Furthermore, applied GA_3 at 25 ppm kept fruit firmness to a long time while, GA_3 at 25 ppm + $KMnO_4$ at 0.1% increased SSC / acid ratio in fruit juice which guide to expand marketing period of peach fruit in emporiums.

INTRODUCTION

Peach (*Prunus persica L. Batsch*) falls into the prunoideae subfamily of the Rosacea ,often referred to collectively as "stone fruits" originated in China. Peach is one of the most important fruits all over the world . Peach had been introduced to Egypt, in middle ages from Syria .Ancient cultivars belong mainly to the Southern Spanish group .Low chilling cultivars have been imported mainly from Florida early in 1980, and many of them are well adapted in Egypt.

Peach area in Egypt reached about 79199 feddans with total production of 360937 metric tons according to the statistics of the Ministry of Agriculture in 2004.

Newly some peach cultivars are spread and planted at desert soil through the last decade in Egypt such as FlordaPrince, Early Grande, Desert Red, Swelling, and Desert Gold. Chilling requirements for bud break and flower in these cultivars are 200 – 236 units respectively. Full bloom stage of the Desert Red peach cultivar occurred by mid February so, it reached maturity stage after 103 days from full bloom at the last week of May (Shaltout, 1995 and Mahmoud, 2005) .The skin ground color is yellow blushes about 98% of the external surface of the fruits covered with red blushes while flesh is yellow.

Maturity stage at harvest greatly influence storage life and final fruit quality (Kader and Mitchell,1989). Cold storage aims to reduce the temperature of fruits to a minimum possible level that doesn't injure the fruits, in order to reduce the metabolism and respiration. Stress is usually

categorized by biological or environmental factors, such as chilling injury and quality degradation in fruits.

Gibberellins are used as pre-harvest application in order to improve fruit quality and tree productivity (Looney *et al.*, 1992). Also, exogenous GA_3 improved fruit firmness in Loadel Cling peach (Southwick *et al.*, 1995).

Calcium plays an important role in fruit quality since it maintains cell wall structure, retains fruit firmness, delays ripening & senescence and helps in reducing susceptibility to fruit physical damage. Consequently, Ca not only needs to be taken up by the tree but also needs to be transported to the fruit (Faust, 1989).

Potassium permanganate (an ethylene absorbent) is effective in reducing physiological weight loss and decay(Dutta *et al.*, 1991). KMnO4 can also be used to reduce ethylene production and chilling injury and respiration rate.

The use of the essential oils such as Camphor oil exhibited a high rate of fungal growth and inhibit ethylene production by suppressing ACC synthesis (Rabbany and Mizutani,1996).

As a result of increasing yield of peach and the losses of fruits during harvest system of grading, packing, transporting, storage, post harvest disease and marketing, there is a desperate need for studying how to extend the marketing period and reduce the loss in fruits. So, the main objective of this investigation was to study the effect of gibberellic acid, calcium chloride, potassium permanganate and camphor oil on fruit quality at harvest time and their effect on changes of Desert Red peach fruits at cold storage and through marketing.

MATERIAL AND METHODS

The present study was carried out during the three successive seasons of 2003, 2004 and 2005 (the first season was a preliminary experimental season to select the best concentration of each material under study) on Desert Red peach fruits to evaluate the effect of calcium chloride ($CaCl_2$), gibberellic acid (GA_3), potassium permanganate ($KMnO_4$) and camphor oil as pre-harvest treatments on fruit quality , storage ability under cold storage and during marketing conditions 2 days after cold storage. The peach trees were about eight years old , budded on Nemaguard rootstock grown in sandy soil and planted at 5m apart between rows and 4m between trees (210 trees per Feddan) in EL-Harameen orchard at EL-Khatatba city , Monifia , Governorate.

A factorial experiment in randomized complete block design was used represented by 6 trees per plot and replications per treatments. A single guard tree separated each treatment. Treated rows were separated by 2 un-treated guard tree rows according to Southwick and Yeager, (1995).

The applied treatments as shown from Table (1) were spraying two weeks before harvest time on 21st and 16th May at the first and second seasons respectively, when the skin ground color is yellow covered with red blushes about 98% of the external surface of fruits and firmness reaches

14.0 – 16 lb/inch² according to **Shaltout, (1995)**. About 200 Kg fruits from each treatment were harvested at early morning and transported to the Pomology Department, Faculty of Agriculture, Mansoura University.

Table (1). The applied treatments used:

NO	Treatment used
1	Gibberellic acid (GA_3) at 25 ppm
2	Gibberellic acid (GA_3) at 25 ppm + Potassium permanganate ($KMnO_4$) at 0.1%.
3	Potassium permanganate ($KMnO_4$) at 0.1%.
4	Calcium chloride ($CaCl_2$) at 1% + Potassium permanganate ($KMnO_4$) at 0.1%.
5	Calcium chloride ($CaCl_2$) at 1%.
6	Camphor oil at 0.1%.
7	Control (untreated trees).

Samples from each replicate were taken to study the effect of each treatment on fruit quality at harvest time to determine the initial properties.

For storage studies, all infected and damaged fruits were excluded , then packed using ventilated plastic bags. All bags with fruits were weighed and every six bags were put in ventilated carton box (50×30×12)cm. The total number of boxes were 21 for all treatments, each treatment consists of 3 carton boxes, each box contains 6 ventilation plastic bags and stored at 2°C ± 1 with 90 – 95 % relative humidity according to (Brovelli *et al.*,1998).

One carton box for each treatment was taken at 10 days interval to determine the loss in fruit weight, decayed fruits and changes in fruit quality during cold storage, using 3 plastic bags from each box , the other 3 plastic bags were left in each box and held 2 days at room temperature (as shelf life) to present the changes in fruit properties during marketing after each period of cold storage, then the following parameters were determined and analyzed as following:

1-Total loss in fruit weight :

a-Loss in fruit weight percentage:

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

b– Decay percentage :

$$\text{Decay \%} = \frac{\text{Weight of decayed fruits}}{\text{Initial fruit weight}} \times 100$$

c- Total loss in weight% :

It was calculated by adding percentage of loss in fruit weight and decayed fruits as followed :

Total loss in weight % = loss weight% + decayed fruits weight%

2- Fruit firmness :

It was measured on 10 fruits for each replicate by using a hand Effegi-Penetrometers supplemented with a plunger 9 mm tip by removing a small

exocarp segment on the two opposite sides of each fruit to expose the flesh. The average was estimated as lb/inch² (**Southwick *et al.*,1995**).

3- Soluble solids content (SSC) /acid ratio :

4- Total anthocyanin content :

It was measured in fruit skin at 535 ^{nm} using spectrophotometer according to **Hsia *et al.*,(1965)**.

The content of total anthocyanin in fruit skin was calculated using the following equations:

$$\text{Total anthocyanin content mg / 100 gm} = \frac{\text{Total Absorbance}}{98.2(E)}$$

The (E) value for 1% solution at 535 ^{nm} is equal to 98.2. Therefore, the absorbance of a solution containing 1 mg is equal to 98.2 according to (Ranganna, 1979).

5- Marketing study :

The three replicates in each carton box for each treatment were left at the end of each cold storage period , then held 2 days at room temperature conditions which presented in Table (2) as shelf life to study the effect of above mentioned treatments on the percent of fruit weight loss and decayed fruits under room temperature conditions. Both room temperature and RH were determined using Thermo – hydrograph as monthly average.

Table (2): Average temperature and relative humidity % during marketing:

Days	10 / 6	11/ 6	19 / 6	20 / 6	28 / 6	29 / 6
Temp. °c	24	24	26	25	28	27
R.H%	70	71	74	73	76	75

Sample of 10 fruits from each treatment was taken to determine the following parameters:
-Fruit firmness lb/inch².
-SSC / acid ratio.
-Total anthocyanin content mg/100 gm fresh weight.

6-Statistical analysis :

Data of both seasons of the study were designed by using complete randomized block design as described by Snedecor and Cochran , (1980). Differences among treatment means were statistically analyzed by using the least significant differences test (LSD) at 5 % level of probability.

RESULTS AND DISCUSION

1-Effect on total loss in weight of peach fruit:

Total loss in weight is including both loss in fruit weight due to loss in water and decayed fruit during cold storage and through marketing, 2 days at room temperature.

Loss in fruit weight % :

Data from Tables (3 and 4) presented that the loss in fruit weight was gradually increased at cold storage and during marketing as storage period prolonged. So, this may be due to shrinkage of the fruit during the storage period .Since, EL-Zayat *et al.*, (1996) declosed that the loss in fruit weight percentage increased as the storage period advanced.

Table (3): Effect of pre - harvest treatments on weight loss %, decay % and total loss % in Desert Red peach fruits after 30 days under cold storage seasons 2004 – 2005.

Treatment	weight Loss %		Decay %		Total loss %	
	2004	2005	2004	2005	2004	2005
GA_3 at 25 ppm	3.00	2.88	7.13	7.41	10.13	10.29
GA_3 at 25 ppm +$KMnO_4$ at 0.1 %	2.81	2.68	7.05	6.97	9.86	9.65
$KMnO_4$ at 0.1 %	2.97	2.71	7.36	7.03	10.33	9.74
$CaCl_2$ at 1.0 % +$KMnO_4$ at 0.1 %	2.60	2.60	8.00	8.33	10.60	10.93
$CaCl_2$ at 1.0 %	3.13	3.12	7.80	8.55	10.93	11.67
Camphor oil at 0.1 %	2.62	2.73	7.00	6.91	9.62	9.64
Control	3.91	3.47	8.11	8.93	12.02	12.40
Mean	3.01	2.88	7.49	7.73	10.50	10.62
L.S.D. at 5 %	0.024	0.026	0.019	0.016	0.030	0.031

The data also disclose that all applied treatments significantly reduced the percent of loss in fruit weight than the control under cold storage or held at room temperature. Since, the percent of loss in fruit weight at the untreated trees were 3.91 and 3.47% after 30 days of cold storage but it reached 6.0 and 5.11 % after two days during marketing in both seasons, respectively.

Treatment with $CaCL_2$ at 1% + $KMnO_4$ at 0.1% reduced the percent of loss in fruit weight than the other treatments used or the control since it presented about 2.60 % after 30 days of cold storage in the two seasons and reached about 3.87 and 4.0 % 2 days during marketing respectively. That is mainly due to water loss as a result of evaporation of water through fruit surface.

Also, Ca often influences various senescence characteristics such as respiration rate and ethylene production of different fruits by maintaining membrane integrity and inhibited C_2H_4 formation (Eaks, 1985).

In addition, GA_3 at 25 ppm+ $KMnO_4$ at 0.1 % reduced loss weight percentage than those treated with GA_3 or $KMnO_4$ alone under 30 days of cold storage and during marketing in both seasons. Dutta *et al.*, (1991) mentioned that the lowest physiological weight loss and highest percentage marketable fruits were obtained by using clite $KMnO_4$ after 15 days of storage.

With regard to the effect of GA3 Valero *et al.*,(1998) found that gibberellin application is followed by an increase in polyamine levels and in the activities of their biosynthetic enzymes, and exogenous polyamines delayed senescence and prolonged fruit storage, physiological processes that are usually accompanied by decreases in plant polyamines. Thus, polyamines infiltration reduced the weight loss during storage through the maintenance of higher endogenous putrescine and spermidine levels than those found in control.

Table (4): Effect of pre - harvest treatments on weight loss %, decay % and total loss % in Desert Red peach fruits two days during marketing at room temperature after 30 days under cold storage seasons 2004 – 2005.

Treatment	weight Loss %		Decay %		Total loss %	
	2004	2005	2004	2005	2004	2005
GA_3 at 25 ppm	5.00	4.64	26.30	28.00	31.30	32.64
GA_3 at 25 ppm +$KMnO_4$ at 0.1 %	4.16	4.16	22.00	21.40	26.16	25.56
$KMnO_4$ at 0.1 %	4.26	4.78	25.00	23.00	29.26	27.78
$CaCl_2$ at 1.0 % +$KMnO_4$ at 0.1 %	4.00	3.87	21.70	19.60	25.70	23.47
$CaCl_2$ at 1.0 %	5.16	4.91	25.00	29.60	30.16	34.51
Camphor oil at 0.1 %	4.28	4.00	21.00	17.90	25.28	21.90
Control	6.00	5.11	43.00	48.00	49.00	53.11
Mean	4.69	4.50	26.29	26.79	30.98	31.29
L.S.D. at 5 %	0.031	0.026	0.072	0.119	0.367	0.123

Decay percentage:

It is clear from Tables (3 and 4) that the percent of decayed fruits for the control ranged about 8.52 % after 30 days of cold storage, but it reached about 45.5 % through marketing as a mean of the two seasons of study.

Furthermore, camphor oil at 0.1 % presented a lower percent of decayed fruits after 30 days of cold storage (7.0 and 6.91 %) but, it reached 21.0 and 17.90 % during marketing in both seasons respectively. In this respect, the basic component of essential oil such as craven found to be completely inhibited 3 hydroxy-3-methy glutrayl coenzyme A reductase (HMGR), the key enzyme of mevalonate pathway (Oosterhaven *et al.*,1993). Mevalonate known to be the main pathway of gibberellins biosynthesis. Similarly, other inhibitors as (paclobutrazol) has been known to block the oxidation of kaurene oxidase on GA biosynthesis (Dalziel and Lawrence, 1984).

Regarding, to the effect of GA_3, $CaCl_2$ and $KMnO_4$ application on the percent of decayed fruits, the data reveal that applied GA_3 at 25 ppm + $KMnO_4$ at 0.1% was more effective in reducing decayed fruits compared with GA_3 or $KMnO_4$ alone. In this respect, GA_3 at 25 ppm + $KMnO_4$ at 0.1% presented about 7.05 and 6.97 % decayed fruits after 30 days of cold storage and reached about 22.0 and 21.40 % after 2 days during marketing in the same period as a mean of two seasons. Also, GA_3 reduced respiration rate and inhibited ethylene production in peach fruit tissue during storage, this is may be correlated to the inhibition of the ripening process (Romero *et al.*,2000).

Moreover, $CaCl_2$ at 1 % + $KMnO_4$ at 0.1% reduced the percent of decayed fruits, it attributed to these treatment about 21.70 and 19.60% after 2 days during marketing in both seasons. These results could be explained by the effect of calcium on increasing cell wall calcium content which help in maintaining fruit firmness to resist decay by certain pathogens and inhibited

the activity of *Penicillium expansum*, Polygalacturonase enzyme and provided broad spectrum protection against post-harvest pathogens (Conway *et al.*, 1992). Moreover, Ca induced resistance to post-harvest pathogens has been attributed to an interaction between certain cell components and Ca ions (Conway *et al.*, 1994).Also, calcium is known as a retardant of senescence and a major factor in preventing physiological disorders in fruits and other plant tissues (Lau *et al.*, 1983).

Total loss in weight % :

Total losses in fruit weight is mainly due to the loss in fruit weight and decayed fruits are presented in Tables (3 and 4). From these data, it is clear that the total loss in fruit weight was gradually increased either at cold storage or during marketing as storage period prolonged. Moreover, all the applied treatments reduced the percent of total loss weight in fruit than the untreated ones. Yet, the percent of total loss in fruit weight were 12.02 and 12.40% under 30 days of cold storage and reached 49.0 and 53.11 % two days during marketing in both seasons respectively.

Camphor oil application at 0.1 % reduced the total loss in fruit weight than the other treatments used either at 30 days from cold storage or during marketing at the same time. Yet, the percentage of total loss in fruit weight due to use of camphor oil was about 9.63 % after 30 days of cold storage, but reached about 23.59 % during marketing respectively as mean of two seasons. Since, this treatment reduced both loss in fruit weight and was more effective for reducing the percentage of decayed fruits.

Moreover, application of GA_3 at 25 ppm + $KMnO_4$ at 0.1% was more effective in reducing the percent of total loss in fruits compared with GA_3 or $KMnO_4$ each alone. The percentage of total loss due to this treatment was about 9.76 % after 30 days of cold storage, and reached 25.86 during marketing respectively as mean of the two seasons. Furthermore, Palou and Crisosto, (2003) stored Patterson apricots fruits at 5 °C for 14 days with three packaged with nine g potassium permanganate sachets per box . They found that, packaging with $KMNO_4$ sachets was the best for reducing fruit spoilage, brown rot, physiological weight loss and decay with increase of storage life.

Furthermore, $CaCl_2$ at 1 % + $KMnO_4$ at 0.1% application reduced the percent of total loss than the $CaCl_2$ or $KMnO_4$ alone or the control 2 days during marketing after 30 days of cold storage in the two seasons. Since, the percentage attributed of total loss due to this treatment were about 25.70 and 23.47 %. In this respect, Wade, (1981) declosed that calcium application to peach fruit prevented internal breakdown, decreased internal browning and reduced cold storage damage. Glenn *et al.*, (1988) mentioned that calcium is essential for the structure and function of cell walls and membranes that are thought to be sites of its anti-senescence action.

2-Effect on firmness of peach fruit:

Data from Table (5) showed that, fruit firmness in Desert Red peach was significantly reduced from harvest till 30 days under cold storage or during marketing.

However, the reduction in fruit firmness was higher during marketing at room temperature than at cold storage. Since, the values of pulp firmness of the untreated fruits was 6.30 lb/inch² after 30 days under cold storage but reached about 3.05 lb/inch² during marketing as a mean of both seasons.

The data also exposed that, all treatments used significantly reduced firmness than the control at cold storage or during marketing at room temperature.

Since, GA_3 application at 25 ppm presented a higher fruit firmness than all treatments used or the control at 30 days of cold storage or during marketing at room temperature as a mean of both seasons.

These results mainly due to the effect of GA3 treatment in inhibiting ethylene production in peach fruit tissue during storage, this is correlated to an inhibition of the ripening process and to the high peach firmness during storage. In addition, Khader, (1992) and Friedman, (1996) mentioned that GA3 treatments were effective in reducing the susceptibility of the fruits to be mechanically damaged and delaying senescence of the fruits, prolong storage life and inhibited ethylene production.

Furthermore, Romero *et al.*,(2000) studied the effect of GA3 at 100 mg /L on Baby Gold peach then stored at 2°C for 14 days and found that GA3 maintained higher fruit firmness during storage, the respiration rate and ethylene emission were reduced compared with control.

Regarding, to $CaCl_2$ at 1 % + $KMno_4$ at 0.1% application the data reveal that the value of fruit firmness was increased than $CaCl_2$ at 1 % or $KMno_4$ at 0.1 % each alone till 30 days under cold storage. However, use of them only gave the lowest increment in fruit firmness at 30 days of cold storage

Table (5): Effect of pre-harvest treatments on firmness (lb/inch²) in Desert Red peach fruits after 30days under cold storage and two days during marketing at room temperature seasons 2004 – 2005.

Treatment	Cold storage				2 days during marketing			
	Season 2004		Season 2005		Season 2004		Season 2005	
	Storage period in days							
	0	30	0	30	0	30	0	30
GA_3 at 25 ppm	16.30	9.00	15.00	9.60	16.30	4.20	15.00	4.66
GA_3 at 25 ppm +$KMnO_4$ at 0.1 %	15.90	8.66	16.00	8.00	15.90	4.00	16.00	4.00
$KMnO_4$ at 0.1 %	15.53	7.03	14.90	7.23	15.53	3.80	14.90	4.00
$CaCl_2$ at 1.0 % +$KMnO_4$ at 0.1 %	16.00	9.20	15.23	8.20	16.00	3.63	15.23	3.90
$CaCl_2$ at 1.0 %	15.43	7.16	14.80	7.33	15.43	4.00	14.80	3.66
Camphor oil at 0.1 %	15.60	8.00	15.00	7.63	15.60	4.00	15.00	4.20
Control	15.00	6.60	14.00	6.00	15.00	3.16	14.00	2.93
Mean	15.68	7.95	14.99	7.71	15.68	3.83	14.99	3.91
L.S.D. at 5 %	0.270	0.170	0.240	0.163	0.270	0.133	0.240	0.129

3-Effect on SSC/ acid ratio in juice of peach fruit:

Considering to the effect on SSC/acid ratio, data in Table (6) reveal that the values of SSC/acid ratio were progressively increased by the storage

period advanced from harvest till 30 days either at cold storage or during marketing at room temperature.

Thus, the values of SSC/acid ratio in fruit juice were higher during marketing than at cold storage. The increment in SSC/acid ratio during the storage period mainly due to the augmentation of SSC content with the reduction in total acidity in fruit juice as the storage period advanced.

With regard to the effect of these treatments on SSC/acid ratio the data reveal that, Camphor oil at 0.1% produced higher value of SSC/acid ratio in the first season at cold storage since the values ranged about 17.66 % and during marketing which were 18.81 and 19.64 % under the two seasons respectively. Whereas, $CaCl_2$ at 1 % produced a higher value of this trend at cold storage in the second season realized 17.24 %.

Table (6): Effect of pre-harvest treatments on SSC / acid ratio % in Desert Red peach fruits after 30days under cold storage and two days during marketing at room temperature seasons 2004 – 2005.

Treatment	Cold storage				2 days during marketing			
	Season 2004		Season 2005		Season 2004		Season 2005	
	Storage period in days							
	0	30	0	30	0	30	0	30
GA_3 at 25 ppm	12.50	16.00	12.56	14.66	12.50	17.06	12.56	15.12
GA_3 at 25 ppm +$KMnO_4$ at 0.1 %	12.83	15.88	12.56	16.03	12.83	17.01	12.56	17.97
$KMnO_4$ at 0.1 %	12.83	16.04	12.36	16.29	12.83	17.70	12.36	17.90
$CaCl_2$ at 1.0 % +$KMnO_4$ at 0.1 %	12.90	15.75	12.13	16.47	12.90	17.85	12.13	18.40
$CaCl_2$ at 1.0 %	12.73	16.53	12.53	17.24	12.73	18.43	12.53	18.33
Camphor oil at 0.1 %	12.36	17.66	12.16	16.80	12.36	18.81	12.16	19.64
Control	12.90	17.22	12.60	17.18	12.90	18.32	12.60	17..57
Mean	12.72	16.41	12.41	16.38	12.72	17.88	12.41	17.85
L.S.D. at 5 %	0.160	0.180	0.100	0.187	0.160	0.196	0.100	0.215

4-Effect on total anthocyanin content of peach fruit:

It is clear from Table (7) that the changes in total anthocyanin content in the skin of peach fruits was gradually increased from harvest till 30 days either at cold storage or 2 days during marketing after cold storage.

Also, all treatments applied increased the content of anthocyanin in the fruits than the control under cold storage or at room temperature.

Moreover, camphor oil at 0.1% and $CaCl_2$ at 1 % + $KMnO_4$ at 0.1% applications significantly increased the content of anthocyanin in the skin of peach fruits than the other treatments used or the control during both seasons.

Yet, GA_3 at 25 ppm + $KMnO_4$ at 0.1 % application presented lower values of anthocyanin in the skin of peach fruits than the other treatments used after 30 days of cold storage or 2 days during marketing through the both seasons.

Since, Rabeh and Allam (1988) and Ezz *et al.*, (2000) revealed that through the storage period of Early Grand peach there was a gradual increase in both carotenoid and anthocyanin levels. This may be due to yellowing and red

coloration of peach fruit appeared to be caused by chlorophyll degradation rather than by changes in carotenoid and anthocyanin levels. Furthermore, the values attributed from all treatments were almost higher than those obtained from the untreated fruit under cold storage or during marketing.
Yet, the values of total anthocyanin during marketing were higher than those obtained at cold storage during the both seasons of study.

Table (7): Effect of pre-harvest treatments on anthocyanin content (mg / 100 g fresh weight) in Desert Red peach fruits after 30days under cold storage and two days during marketing at room temperature seasons 2004 – 2005.

Treatment	Cold storage				2 days during marketing			
	Season 2004		Season 2005		Season 2004		Season 2005	
	Storage period in days							
	0	30	0	30	0	30	0	30
GA_3 at 25 ppm	14.10	17.90	13.90	17.70	14.10	18.00	13.90	17.90
GA_3 at 25 ppm +$KMnO_4$ at 0.1 %	13.70	16.60	13.80	16.80	13.70	16.90	13.80	16.90
$KMnO_4$ at 0.1 %	14.90	18.00	14.80	18.10	14.90	18.00	14.80	18.30
$CaCl_2$ at 1.0 % +$KMnO_4$ at 0.1 %	15.00	18.40	14.70	18.50	15.00	18.50	14.70	18.60
$CaCl_2$ at 1.0 %	14.40	18.00	14.20	18.10	14.40	18.30	14.20	18.30
Camphor oil at 0.1 %	15.10	18.40	15.00	18.80	15.10	18.50	15.00	18.70
Control	14.20	16.10	14.00	16.30	14.20	16.20	14.00	16.50
Mean	14.49	17.63	14.34	17.76	14.49	17.77	14.34	17.89
L.S.D. at 5 %	0.060	0.172	0.050	0.165	0.060	0.087	0.050	0.101

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معاملات ما قبل و بعد الحصاد على ثمار الخوخ المنزرعة تحت ظروف الأراضي الصحراوية

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أجريت هذه الدراسة خلال أعوام ٢٠٠٣- ٢٠٠٤-٢٠٠٥ لتقييم تأثير الرش بكل من حمض الجبر ليك ،كلوريد الكالسيوم، برمنجنات البوتاسيوم و زيت الكافور كمعاملات قبل الحصاد على صفات الثمار وقت الحصاد و على القدرة التخزينيه لثمار الديزرت رد أثناء التخزين البارد وكذلك خلال التسويق على درجه حرارة الغرفة بعد يومين من التخزين البارد.

أوضحت النتائج أن رش أشجار الخوخ قبل الجمع بأسبوعين بماده زيت الكافور ٠,١% حيث أنها ماده طبيعية أمنه تماما و لها القدرة على خفض نسبه الثمار التالفة و كذلك معدل الفقد الكلى فى الوزن خلال التخزين البارد و التداول فى جو الغرفة، كما تساعد على المحافظة على صفات الجودة مع زيادة صلابة الثمار و محتواها من صبغه الانثوسيانين.

كذلك الرش بكلوريد الكالسيوم١% + برمنجنات البوتاسيوم٠,١% يساعد على تقليل النسبة المئوية للفقد فى الوزن مع تحسين صلابة الثمار و محتواها من صبغه الانثوسيانين ، كما أن أضافه حمض الجبر ليك٢٥ جزء فى المليون تؤدى لاحتفاظ الثمار بصلابتها لفترة أطول، بينما رش حمض الجبر ليك٢٥ جزء فى المليون + برمنجنات البوتاسيوم٠,١% يعمل على زيادة محتوى عصير الثمار من المواد الصلبه الذائبة مما يساعد على أطاله الفترة التسويقية لثمار الخوخ بالأسواق.