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Post-Harvest Applications by Calcium Chloride and Ascorbic Acid Enhanced Storage Ability of Peach Fruits Cv. Floridaprince

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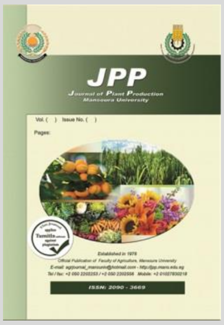

ABSTRACT

This study was conducted during two successive seasons (2016 and 2017) to evaluate the effect of post-harvest applications by calcium chloride at 1% and ascorbic acid (AC) at concentrations of 0.5, 1, 1.5 and 2% as soaking treatment on some "Floridaprince" peach fruit quality parameters. The fruits were stored under cold storage conditions (2±1˚C and 90-95% RH) for 30 days and 2 days at ambient conditions after every cold storage period (10 days). The various physiochemical attributes of fruits were recorded after 0, 10, 20, 30 days in cold storage and after 2 days at ambient conditions of every cold storage period. Fruit weight loss (%), SSC (˚Brix), SSC/acid ratio, Relative electrical conductivity (Rec %) of Floridaprince peach fruits were increased in most cases; whereas, titratable acidity (%), V.C (mg/100g) and firmness (Ib/inch^2), total phenol (mg/g) and anthocyanin (mg/100g) were decreased with advancing the storage period. However, the results of the study indicated that Floridaprince peach fruits soaked in 1% $CaCl_2$ + 1.5% AC showed a significant deterioration delay in the different determined parameters of Floridaprince peach fruits either at cold storage or ambient condition. Fruits soaked in 1% $CaCl_2$ + 1.5% AC can be successfully stored for 20 days under cold storage conditions and 2 days at ambient conditions after cold storage with highly acceptable sensory quality.

Keywords: Floridaprince peach, ascorbic acid, calcium chloride, Cold storage, postharvest.

INTRODUCTION

In the genus Prunus, Peach (*Prunus persica*, L. Batsch cv. Floridaprince) is the most important stone crop cultivated in Egypt. It is an early cultivar that displayed a high acclimation with the local ecological conditions. It records superior yield and fruit quality in comparison with the other peach cultivars (Kanwar *et al*., 2000). The peach area in Egypt is about 24707 ha which given about 360723 tones (FAO, 2017).

Peach has a short shelf life and its quality break downs quickly after harvest. The average fruit physiological degradation is correlated with the respiration rate (Kader *et al*., 1989). Though postharvest application with different chemicals (e.g. calcium chloride and ascorbic acid) is essential to improve fruit quality after harvest and reduce the rate of quality loss; hence, the degradation of ascorbic acid during ripening and preservation by 50-60% approximately (Sass, 1993).

Ca^{++} work on pectin of the middle lamella and cell wall to compose calcium pectate. This manipulates the turgor pressure of tissues, cell wall strength, and decrease firmness loss in peaches (Manganaris *et al*., 2005$_a$). Also, calcium equiponderates cell membrane and thus participate in firmness (Fan *et al*., 2005). On the contrary, firmness decreased considerably with high concentrations of calcium chloride used singly; therefore, we used the authorized concentration of calcium chloride (1%) in this study. This is because the high concentrations of $CaCl_2$ application may have stimulated exertion on the tissues and then caused an increment in ethylene output and respiration rate (Luna-Guzman *et al*., 1999). An excess in respiration rate and ethylene output is attached by an excess in an enzymatic breakdown which leads to senescence (Mishra, 2002). Therefore, the tissues were probably mushy than the untreated fruits.

It is noticed a decrease in ascorbic acid (AC) with high concentrations of calcium chloride at 2 or 4 percent (Abd-elghany *et al*., 2012); furthermore, ascorbic acid already decreased during storage and that perhaps due to oxidation of ascorbic acid during preservation (Kubac *et al*., 2011). The reduction in ascorbic acid content during the preservation period was that it performs as an oxygen scavenger and however restrain enzymatic browning, it acquires itself oxidized (Marshall *et al*., 2000). Oxidative reactions feign to be the major reason for ascorbic acid retrogradation, and therefore the antioxidant application (e.g. ascorbic acid) may prohibit such demolition, resulting in a fresh product with a final ascorbic acid content as high as the fresh fruits.

However, peach fruit is climacteric fruit retaining a high degree of perishability and to depress the post-harvest damages, some post-harvest application is needed to prolong the shelf life of fruits. Accordingly, the present investigation aims to reach the optimal concentration of ascorbic acid in combination with calcium chloride at 1% which enhances the physiochemical properties of peach fruit under cold storage and ambient condition.

MATERIALS AND METHODS

The present investigation was done during the 2016 and 2017 seasons at the Pomology Dept. Floridaprince peach fruits were harvested at the end of April when the peel color is yellow about 98% of the outer surface of fruits covering with red blushes and firmness ranges about 14.0 –

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16.0 Ib/inch² according to **Shaltout (1995)** from a commercial orchard at Abo-khalb city, El-Giza Governorate, Egypt. Before the decontamination, all fruits were assorted anchor on proportional size without any infections and then decontaminated with 1% Sodium hypochlorite (v/v) for 2 min, swilled in distilled water and dried for 3 h at 21°C on a paper tissue. Then fruits divided into 6 parts each containing 144 fruits and soaked into the following solutions for 5 min:

1) 1% $CaCl_2$
2) 1% $CaCl_2$ + 0.5% Ascorbic acid (AC)
3) 1% $CaCl_2$ + 1% AC
4) 1% $CaCl_2$ + 1.5% AC
5) 1% $CaCl_2$ + 2% AC
6) Distilled water (Control)

After the time set for soaking, fruits were promptly conveyed out and dried with blowing air at 25±2 °C. The fruits of each treatment were divided into 18 parts (8 fruits for each part), then each part was packed in a perforated plastic bag and weighted. Every 6 bags were put in a perforated cardboard box, thus each treated part contained 3 boxes which were transported for cold storage at 2°C ± 1 with 90 – 95 % RH for 30 days according to Brovelli *et al.* (1998).

One carton box of each treatment which contained 6 perforated plastic bags was taken every 10 days, and half of its content of bags was used for the various analysis of fruits quality at cold storage and the remaining bags were left for 2 days at the ambient condition to evaluate the alteration in fruits characteristics at ambient conditions then the following parameters were determined and analyzed as following:

Loss in fruit weight percentage:

Weight loss percentage for each replicate every 10 days intervals calculated as followed:

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

Soluble solids content (SSC) (°Brix):

It estimated in fruit juice by using a Carl-Zeiss hand refractometer (AOAC, 1994).

Total titratable acidity (%):

It expressed as g malic acid / 100 ml juice (AOAC, 1994).

Soluble solids content (SSC) / acid ratio:

This ratio calculated from the results recorded for fruit juice SSC and titratable acidity.

Vitamin C (mg/100g):

It was estimated by a 2,6-dichlorophenol indophenol method (Mazumadar and Majumder, 2003). A Known amount of edible portion of "Floridaprince" peach fruits extracted with 3% meta-phosphoric by thorough crushing. The extract filtered and made up to a known volume with 3% meta-phosphoric then titrated with the standard indophenol dye solution to a pink endpoint (persisting for fifteen sec.).

Fruit firmness (lb/inch^2):

A hand Effegi-Penetrometers attached with plunger 8 mm diameter was utilized to estimate this parameter as Ib/in^2 (Southwick *et al.*, 1996).

Relative electrical conductivity (REC %):

It was estimated from the following equation:

$$\text{REC (\%)} = (C60 - C1) / CT \times 100$$

By Conductivity meter (CD-4301) according to Fan and Sokorai (2005).

C1= Initial electrolyte leakage was determined at 1 min of incubation

C60 = Initial electrolyte leakage was determined at 60 min of incubation

CT= total conductivity of samples after autoclaving at 121°C for 25 minutes which readjusted to a volume of 50 ml.

Total phenols (mg/g):

The value of the colored solution of a fresh sample extracted with 80% ethanol was measured at 650 nm optical density (O.D.) wavelength using a spectrophotometer (Mazumadar and Majumder, 2003).

Total anthocyanin content (mg/100g) :

It was estimated by extracting a half gram of fresh fruit skin in 10 ml of the ethanolic-hydrochloride acid mixture and the value of optical density was measured at 535 nm wavelength by used a spectrophotometer (Mazumadar and Majumder, 2003).

Marketing study:

To evaluate the changes in physical and chemical properties on the above- mentioned parameters of fruits during ambient conditions at the end of each cold storage period, the remaining bags were held 2 days at room temperature conditions which presented in Table (1); hence, both room temperature and RH were determined using Thermo-hydrograph as a daily average.

Table 1. Average temperature and relative humidity % during marketing:

Date (day/month)	6-7 / 5	16-17/ 5	26-27/ 5
Temp. °C	17.67	19	19
RH%	23.5	33	27

Statistical analysis:

The acquired results were statistically analyzed as a randomized complete design by analysis of variance (ANOVA) corresponding to the method of Snedecor and Cochran (1994), utilizing SAS software (SAS Institute Inc. Cary, NC, USA). Comparisons between means were made by utilizing the LSD test at a 5% level of probability (Waller and Duncan, 1969).

RESULTS AND DISCUSSION

Loss in fruit weight % :

Tested applications have reduced loss in fruit weight percentage of Floridaprince peach fruits significantly during storage period compared with control in the two seasons as illustrated in Tables 2 and 3. Generally, the combination of 1% $CaCl_2$ with 1.5% AC was the best application in this concept, pursued by 1% $CaCl_2$ with 1% AC than using $CaCl_2$ alone.

These results correspond with Sohail *et al.* (2015) who declared that loss in fruit weight is mainly related to moisture evaporation and respiration through the exocarp. The soft exocarp of peach fruits makes them squeamish to lose water rapidly, leading to retro-gradation of the fruits and utilizing calcium chloride obstruct water transfer which explains the lower weight loss observed in fruits treated with calcium. Moreover, ascorbic acid might minimize ethylene creation and respiration rate by preventing the probable free radical interfering ascorbic acid to the pathway of ethylene (Apelbaum *et al.*, 1981).

As for the effect of storage periods, it is quite clear from Tables 2 and 3 that Floridaprince peach fruits missed weight with the progress of storage period at cold storage or shelf life. Hence, thirty days of cold storage registered the highest loss in fruit weight; while, " regardless of zero-day" the lowest data was observed after ten days of cold storage in two seasons. These results are in agreement with those mentioned by Amal *et al*. (2010) who reported that weight loss occurs during fruits storage as a result of some processes of oxidation; nevertheless, fruits treated with calcium chloride reduced fruit weight loss significantly comparing with control. Moreover, Gill *et al*. (2014) noticed that the average loss in fruit weight diminished appreciably by boosting the concentration of ascorbic acid which reducing fruit weight loss, microbial growth and color changes (Puthmee *et al*., 2009).

Regarding the interaction effect between examined soaking solutions and storage period, Tables 2 and 3 show that the interactions of ten days storage period gave the lowest weight loss percentages especially, the fruits soaked in a solution of 1% $CaCl_2$ + 1.5% AC during both seasons. Conversely, 30 days of storage period interactions presented the highest percentage of fruit weight loss combinations, especially with "control" in the two seasons. The other applications demonstrated medium values in this respect at cold storage or shelf life.

The registered values of loss in "Floridaprince" peach fruits weight compatible with Hussain *et al*. (2012) who mentioned that dipping fruits in $CaCl_2$ decrease weight loss as a reason of $CaCl_2$ roles on delaying respiration, incipience of the climacteric, ripening, and senescence; moreover, Dequan Sun *et al*. (2010) stated that ascorbic acid delayed pericarp browning by increasing the capacity of anti-oxidation and averting dehydration concurrently.

Table 2. Loss in "Floridaprince" peach fruits weight percentage at different storage periods during the 2016 season.

Soaking solutions	Loss in fruit weight % (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking treatments
1% $CaCl_2$	0.00	2.42	7.47	15.47	6.34	0.00	11.95	19.12	24.54	13.91
1% $CaCl_2$ + 0.5% AC	0.00	2.53	8.81	15.90	6.81	0.00	12.84	19.70	26.37	14.73
1% $CaCl_2$ + 1% AC	0.00	2.29	7.22	15.27	6.12	0.00	11.33	19.05	23.93	13.58
1% $CaCl_2$ + 1.5% AC	0.00	1.58	5.20	11.0	4.45	0.00	10.61	16.86	21.71	12.29
1% $CaCl_2$ + 2% AC	0.00	2.69	8.91	16.38	7.00	0.00	14.76	17.96	29.83	15.64
Control	0.00	3.76	10.77	18.25	8.20	0.00	17.08	24.32	31.05	18.11
Mean of storage period	0.00	2.55	8.06	15.38	-	0.00	13.09	19.50	26.24	-
LSD at 5%	Soaking treatments (S) = 0.01 Storage period(P) =0.01 S x P = 0.02					Soaking treatments (S) =0.03 Storage period(P) =0.03 S x P = 0.07				

Table 3. Loss in "Floridaprince" peach fruits weight percentage at different storage periods during the 2017 season.

Soaking solutions	Loss in fruit weight % (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	0.00	2.92	7.97	15.97	6.72	0.00	12.45	19.62	25.04	14.28
1% $CaCl_2$ + 0.5% AC	0.00	3.027	9.31	16.40	7.18	0.00	13.34	20.20	26.87	15.10
1% $CaCl_2$ + 1% AC	0.00	2.79	7.72	15.77	6.57	0.00	11.83	19.55	24.43	13.95
1% $CaCl_2$ + 1.5% AC	0.00	2.08	5.70	11.58	4.84	0.00	11.12	17.36	22.21	12.67
1% $CaCl_2$ + 2% AC	0.00	3.19	9.41	16.88	7.37	0.00	15.26	18.46	30.33	16.01
Control	0.00	4.26	11.27	18.75	8.57	0.00	17.58	24.82	31.55	18.49
Mean of storage period	0.00	3.045	8.56	15.89	-	0.00	13.59	20.00	26.74	-
LSD at 5%	Soaking solutions (S) = 0.011 Storage period(P) = 0.013 S x P =0.017					Soaking solutions (S) = 0.037 Storage period(P) =0.029 S x P = 0.072				

Soluble solids content (SSC) (°Brix):

The different soaking treatments mentioned in Tables 4 and 5 affect the soluble solids content of "Floridaprince peach" fruit juice in the two seasons. Hence, the highest result was recorded by control in the two seasons at cold storage and shelf life. Besides, the SSC of fruits soaked in 1% $CaCl_2$ + 2% AC solution was increased compared with other soaking solutions in the two seasons.

Relative to the effect of storage duration, soluble solid content of "Floridaprince" peach fruit juice steadily accumulate with progressing the storage durations until attaining the greatest increment after thirty days of cold storage in the two seasons.

Regarding the effect of interaction between the examined soaking solutions and storage periods, values in Tables 4 and 5 enunciate that all interactions increased SSC of "Floridaprince" peach fruit juice compared to the initial values, and the interactions of thirty days storage period with most applications were the dominance in the two seasons.

However, the highest SSC of "Floridaprince" peach fruit juice was presented by control at thirty days of cold storage in the two seasons. Conversely, the lowest data in this respect was obtained by the interaction of storage duration at ten days with fruits soaked in 1% $CaCl_2$ + 1.5% AC solution in the two seasons at cold storage and shelf life.

Data in this concept is compatible with Akhtar *et al*. (2010) who demonstrated that the increment of soluble solid content during preservation may be due to the hydrolysis of polysaccharides and concentrated juice content as a result of dehydration with the passage of storage duration; furthermore, increase in SSC is referred to the enzymatic conversion of higher polysaccharides such as pectin into simple sugars during ripening (Hussain *et al*., 2008).

Table 4. SSC (ºBrix) in "Floridaprince" peach fruit juice at different storage periods during the 2016 season.

Soaking solutions	SSC (ºBrix) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	11.29	11.60	11.67	11.87	11.61	11.29	11.7	11.87	12.08	11.74
1% $CaCl_2$ + 0.5% AC	11.29	11.39	12.09	11.69	11.62	11.29	11.49	11.89	12.31	11.75
1% $CaCl_2$ + 1% AC	11.29	11.5	11.7	11.9	11.6	11.29	11.6	11.9	12.13	11.73
1% $CaCl_2$ + 1.5% AC	11.29	11.4	11.6	11.9	11.48	11.29	11.50	11.80	12.10	11.67
1% $CaCl_2$ + 2% AC	11.29	11.50	11.80	12.20	11.69	11.29	11.70	12.00	12.40	11.85
Control	11.29	12.0	12.1	12.23	11.91	11.29	12.00	12.20	12.30	11.95
Mean of storage period	11.29	11.57	11.83	11.97	-	11.29	11.67	11.94	12.22	-
LSD at 5%	Soaking solutions (S) = 0.119 Storage period(P) =0.098 S x P = 0.239					Soaking solutions (S) = 0.072 Storage period(P) =0.059 S x P = 0.144				

Table 5. SSC (ºBrix) in "Floridaprince" peach fruit juice at different storage periods during the 2017 season.

Soaking solutions	SSC (ºBrix) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	11.79	12.10	12.17	12.37	12.11	11.79	12.17	12.34	12.54	12.21
1% $CaCl_2$ + 0.5% AC	11.79	11.89	12.19	12.59	12.12	11.79	11.99	12.39	12.73	12.23
1% $CaCl_2$ + 1% AC	11.79	12.00	12.20	12.40	12.09	11.79	12.00	12.30	12.70	12.19
1% $CaCl_2$ + 1.5%AC	11.79	11.90	12.10	12.40	12.05	11.79	12.00	12.30	12.60	12.17
1% $CaCl_2$ + 2% AC	11.79	12.00	12.30	12.70	12.19	11.79	12.20	12.50	12.90	12.35
Control	11.79	12.50	12.60	12.73	12.41	11.79	12.50	12.70	12.80	12.45
Mean of storage period	11.79	12.07	12.26	12.53	-	11.79	12.14	12.42	12.71	-
LSD at 5%	Soaking solutions (S) = 0.121 Storage period(P) =0.099 S x P = 0.237					Soaking solutions (S) = 0.069 Storage period(P) =0.055 S x P = 0.141				

Titratable acidity (%):

Data in Tables 6 and 7 confirm that control gave the lowest acidity percentage of "Floridaprince" peach fruit juice; while fruits soaked in 1% $CaCl_2$ + 1.5% AC solution recorded the highest acidity percentage of fruit juice in the two seasons. Besides, an inverse relationship was observed between the acidity ratio and the storage duration to attain the extreme demotion at the thirty days of storage. This tendency was observed in the two seasons at cold storage and shelf life which probably referred to the usage of acids content in respiration (Bhat *et al*., 2012). Furthermore, $CaCl_2$ is useful in preserving acidity of the fruits after harvesting as compared to fruits soaked in distilled water; hence, $CaCl_2$ delayed fruits ripening (Hussain *et al*., 2012).

Referring to the interaction effect between soaking solutions and storage periods, data in Tables 6 and 7 declare that the lowest values of titratable acidity percentage were gained by utilizing the interaction between fruits soaked in distilled water or 1% $CaCl_2$ + 2% AC solution and storage at thirty days in the two seasons .Whilst "regardless of zero-day" the greatest results in this concept were resulted by utilizing the interaction of storage duration at ten days. The residual soaking applications presented moderate values between the aforesaid applications in the two seasons at cold storage and shelf life.

Table 6. Titratable acidity % in "Floridaprince" peach fruit juice at different storage periods during the 2016 season.

Soaking solutions	Titratable acidity % (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	1.04	0.96	0.86	0.76	0.91	1.04	0.91	0.81	0.71	0.87
1% $CaCl_2$ + 0.5% AC	1.04	0.95	0.85	0.75	0.89	1.04	0.88	0.78	0.68	0.85
1% $CaCl_2$ + 1% AC	1.04	0.99	0.89	0.79	0.93	1.04	0.95	0.85	0.75	0.89
1% $CaCl_2$ + 1.5% AC	1.04	1.01	0.91	0.81	0.94	1.04	0.96	0.86	0.76	0.91
1% $CaCl_2$ + 2% AC	1.04	0.79	0.69	0.59	0.78	1.04	0.75	0.65	0.55	0.75
Control	1.04	0.78	0.68	0.58	0.77	1.04	0.73	0.63	0.53	0.73
Mean of storage period	1.04	0.91	0.81	0.71	-	1.04	0.86	0.76	0.66	-
LSD at 5%	Soaking solutions (S) =0.019 Storage period(P) =0.016 S x P = 0.039					Soaking solutions (S) =0.019 Storage period(P) = 0.016 S x P = 0.122				

Table 7. Titratable acidity % in "Floridaprince" peach fruit juice at different storage periods during the 2017 season.

Soaking solutions	Titratable acidity % (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	1.24	1.16	1.06	0.96	1.12	1.24	1.09	0.99	0.89	1.05
1% $CaCl_2$ + 0.5% AC	1.24	1.16	1.06	0.96	1.11	1.24	1.11	1.01	0.91	1.07
1% $CaCl_2$ + 1% AC	1.24	1.19	1.09	0.99	1.13	1.24	1.15	0.95	1.05	1.09
1% $CaCl_2$ + 1.5% AC	1.24	1.21	1.11	1.01	1.14	1.24	1.16	1.06	0.96	1.11
1% $CaCl_2$ + 2% AC	1.24	0.99	0.89	0.79	0.98	1.24	0.95	0.85	0.75	0.95
Control	1.24	0.98	0.88	0.78	0.97	1.24	0.93	0.83	0.73	0.93
Mean of storage period	1.24	1.12	1.02	0.92	-	1.24	1.07	0.95	0.88	-
LSD at 5%	Soaking solutions (S) =0.017 Storage period(P) = 0.014 S x P = 0.037					Soaking solutions (S) = 0.018 Storage period(P) = 0.015 S x P = 0.119				

SSC /acid ratio:

It is evident from Tables 8 and 9 that "Floridaprince" peach fruits soaked in distilled water achieved a significant increase in SSC/acid ratio comparing with the other soaking treatments; alternatively, fruits soaked in 1% $CaCl_2$ + 1.5% AC solution recorded the lowest values in this concept in the two seasons at cold storage and shelf life.

Referring to the storage durations, it affected the SSC/acid ratio which was progressively incremented as storage period proceeding from harvest till the end of storage period at cold storage or shelf life. The increment in SSC/acid ratio among the storage period back to the increment of SSC versus the decrease in total titratable acidity percentage of fruit juice as the storage period prolonged.

Regarding the impact of interactions, data in Tables 8 and 9 present that storage period at ten days with fruits soaked in 1% $CaCl_2$ + 1.5% AC solution at cold storage scored statistically the lowest SSC/acid ratio in the two seasons. Conversely, fruits soaked in distilled water “control” at 30 days storage period presented the highest SSC/acid ratio in the two seasons at cold storage and shelf life. These results were confirmed by Shah and Sajid (2017) who found the increment of SSC/acid ratio with the passage of storage time for peach fruits.

Table 8. SSC/acid ratio in "Floridaprince" peach fruit juice at different storage periods during the 2016 season.

Soaking solutions	SSC /acid ratio (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	10.86	12.08	13.57	15.62	13.03	10.86	12.86	14.65	17.01	13.85
1% $CaCl_2$ + 0.5% AC	10.86	11.99	14.22	15.59	13.16	10.86	13.06	15.24	18.10	14.31
1% $CaCl_2$ + 1% AC	10.86	11.62	13.15	15.06	12.67	10.86	12.21	14.00	16.17	13.31
1% $CaCl_2$ + 1.5% AC	10.86	11.29	12.75	14.69	12.39	10.86	11.98	13.72	15.92	13.12
1% $CaCl_2$ + 2% AC	10.86	14.56	17.10	20.68	15.79	10.86	15.60	18.46	22.55	16.87
Control	10.86	15.38	17.79	21.09	16.28	10.86	16.44	19.37	23.21	17.47
Mean of storage period	10.86	12.58	14.43	16.63	-	10.86	13.41	15.51	18.24	-
LSD at 5%	Soaking solutions (S) = 0.331 Storage period(P) =0.270 S x P = 0.662					Soaking solutions (S) =0.399 Storage period(P) =0.326 S x P =0.799				

Table 9. SSC /acid ratio in "Floridaprince" peach fruit juice at different storage periods during the 2017 season.

Soaking solutions	SSC /acid ratio (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	9.51	10.43	11.48	12.89	11.08	9.51	11.17	12.46	14.09	11.81
1% $CaCl_2$ + 0.5% AC	9.51	10.25	11.5	13.11	11.09	9.51	10.80	12.27	13.99	11.64
1% $CaCl_2$ + 1% AC	9.51	10.08	11.19	12.53	10.82	9.51	10.43	12.95	12.09	11.25
1% $CaCl_2$ + 1.5% AC	9.51	9.83	10.90	12.28	10.63	9.51	10.34	11.60	13.13	11.15
1% $CaCl_2$ + 2% AC	9.51	12.12	13.82	16.08	12.88	9.51	12.84	14.71	17.2	13.56
Control	9.51	12.76	14.32	16.32	13.22	9.51	13.44	15.30	17.53	13.95
Mean of storage period	9.51	10.78	12.02	13.62		9.51	11.35	13.07	14.44	
LSD at 5%	Soaking solutions (S) = 0.233 Storage period(P) =0.191 S x P = 0.467					Soaking solutions (S) = 0.251 Storage period(P) =0.205 S x P =0.502				

Vitamin- C:

The vitamin-C content of "Floridaprince" peach fruits pursued a deteriorate trend proportionate with the progress of storage duration (Tables 10 and 11) and that was in agreement with those stated by Sohail *et al* (2015) who demonstrated that ascorbic acid diminished with the increment of the storage period in peach fruits. But the reduction in ascorbic acid was less in fruits which soaked in different soaking solutions under this study as compared to control. Hence, the fruits soaked in distilled water (control) recorded 3.13 & 3.46 under cold storage condition while recorded 2.59 & 2.92 mg/100g vitamin-C content under room temperature conditions during the first and second seasons, respectively. The 1% $CaCl_2$ + 1.5% AC soaking solution have the potential benefit of better retention of the ascorbic acid, hence; it recorded 6.30 & 6.63 mg/100g vitamin-C content under cold storage condition, and 5.77 & 6.09 mg/100g vitamin-C content under room temperature conditions during both seasons, respectively and that was in harmony with Sohail *et al.* (2013) who proved that $CaCl_2$ support in maintaining vitamin C during fruits preservation. Also, Veltman *et al.* (2000) illustrated that $CaCl_2$ had a significant impact on maintaining ascorbic acid content in peach fruits; hence, $CaCl_2$ slack ascorbic acid oxidation.

Table 10. Vitamin C (mg/100g) in "Floridaprince" peach fruit juice at different storage periods during the 2016 season.

Soaking solutions	Vitamin C (mg/100g) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	4.57	3.89	3.69	2.24	3.59	4.57	3.39	2.94	1.34	3.06
1% $CaCl_2$ + 0.5% AC	5.38	4.96	4.77	2.51	4.41	5.38	4.46	4.02	1.61	3.87
1% $CaCl_2$ + 1% AC	6.49	5.82	5.19	3.96	5.37	6.49	5.32	4.44	3.06	4.83
1% $CaCl_2$ + 1.5% AC	7.56	6.98	6.43	4.24	6.30	7.56	6.48	5.68	3.34	5.77
1% $CaCl_2$ + 2% AC	8.19	6.21	5.08	2.19	5.42	8.19	5.71	4.33	1.29	4.88
Control	4.47	3.57	2.49	1.99	3.13	4.47	3.07	1.74	1.09	2.59
Mean of storage period	6.11	5.24	4.61	2.86	-	6.11	4.74	3.86	1.96	-
LSD at 5%	Soaking solutions (S) = 0.100 Storage period(P) =0.082 S x P = 0.201					Soaking solutions (S) = 0.095 Storage period(P) = 0.078 S x P = 0.197				

Table 11.Vitamin C (mg/100g) in "Floridaprince" peach fruit juice at different storage periods during the 2017 season.

Soaking solutions	Vitamin C (mg/100g) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	4.9	4.22	4.02	2.57	3.93	4.9	3.72	3.27	1.67	3.39
1% $CaCl_2$ + 0.5% AC	5.71	5.29	5.1	2.84	4.74	5.71	4.79	4.35	1.94	4.18
1% $CaCl_2$ + 1% AC	6.82	6.15	5.52	4.29	5.69	6.82	5.65	4.77	3.39	5.16
1% $CaCl_2$ + 1.5% AC	7.89	7.31	6.76	4.57	6.63	7.89	6.81	6.01	3.67	6.09
1% $CaCl_2$ + 2% AC	8.52	6.54	5.41	2.52	5.75	8.52	6.04	4.66	1.62	5.21
Control	4.8	3.9	2.82	2.32	3.46	4.8	3.4	2.07	1.42	2.92
Mean of storage period	6.44	5.57	4.94	3.19	-	6.44	5.07	4.19	2.29	-
LSD at 5%	Soaking solutions (S) =0.099 Storage period(P) = 0.079 S x P =0.198					Soaking solutions (S) = 0.097 Storage period(P) =0.081 S x P =0.196				

Firmness (Ib/inch²):

In general, the firmness of "Floridaprince" peach fruits declined as the storage period advanced (Tables 12 and 13). However, the fruits soaked in distilled water (control) showed a gradual reduction in fruit firmness as compared to other soaking treatment. The average values of fruit firmness in control fruits were 10.59 & 10.89 under cold storage conditions and 6.22 & 6.52 Ib/inch² under ambient conditions during the first and second seasons, respectively.

Table 12.Firmness (Ib/inch²) in "Floridaprince" peach fruits at different storage periods during the 2016 season.

Soaking solutions	Firmness (Ib/inch²) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	14.26	13.10	11.60	9.60	12.14	14.26	8.10	5.6	4.10	8.02
1% $CaCl_2$ + 0.5% AC	14.26	12.73	11.23	9.23	11.86	14.26	7.73	5.23	3.73	7.74
1% $CaCl_2$ + 1% AC	14.26	13.30	11.80	9.80	12.29	14.26	8.30	5.80	4.30	8.17
1% $CaCl_2$ + 1.5% AC	14.26	14.05	13.85	11.85	13.50	14.26	10.35	7.85	6.35	9.70
1% $CaCl_2$ + 2% AC	14.26	12.20	10.70	8.70	11.47	14.26	7.20	4.70	3.20	7.34
Control	14.26	11.20	9.70	7.20	10.59	14.26	5.20	3.70	1.70	6.22
Mean of storage period	14.26	12.76	11.48	9.39	-	14.26	7.81	5.48	3.89	-
LSD at 5%	Soaking solutions (S) = 0.094 Storage period(P) =0.077 S x P = 0.188					Soaking solutions (S) = 0.092 Storage period(P) =0.074 S x P =0.186				

Table 13. Firmness (Ib/inch²) in "Floridaprince" peach fruits at different storage periods during the 2017 season.

Soaking solutions	Firmness (Ib/inch²) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	14.56	13.40	11.90	9.90	12.44	14.56	8.40	5.90	4.40	8.32
1% $CaCl_2$ + 0.5% AC	14.56	13.03	11.53	9.53	12.16	14.56	8.03	5.53	4.03	8.04
1% $CaCl_2$ + 1% AC	14.56	13.60	12.10	10.10	12.59	14.56	8.60	6.10	4.60	8.47
1% $CaCl_2$ + 1.5% AC	14.56	14.25	13.85	12.15	13.70	14.56	10.65	8.15	6.65	10.00
1% $CaCl_2$ + 2% AC	14.56	12.50	11.00	9.00	11.77	14.56	7.50	5.00	3.50	7.64
Control	14.56	11.5	10.00	7.50	10.89	14.56	5.50	4.00	2.00	6.52
Mean of storage period	14.56	13.05	11.73	9.69	-	14.56	8.11	5.78	4.19	-
LSD at 5%	Soaking solutions (S) = 0.091 Storage period(P) = 0.073 S x P = 0.185					Soaking solutions (S) =0.093 Storage period(P) =0.076 S x P = 0.187				

As for the impact of interactions, data presented in the same tables observed that fruits soaked in 1% $CaCl_2$ + 1.5% AC solution under ten days of cold storage scored the highest firmness in the two seasons as a result of calcium role in cell membranes; hence, it assists in diminishing respiration rate of fruits and react with pectic acids in the cell walls to form calcium pectate thus slows down the ripening process and maintain cell wall structure which enhances the fruit firmness (Manganaris *et al*., 2005b).

Furthermore, the antioxidant activity of ascorbic acid which is effective in increasing peach fruit firmness (El-Shazly, 2013). Conversely, fruits soaked in distilled water "control" under 30 days of cold storage scored the lowest fruit firmness in the two seasons at cold storage and shelf life. The acquired results were confirmed by Kaur (2016) who found that ascorbic acid had enhanced firmness of fruits at room temperature compared to control and Alzamora and Salvatori (2006) who reported that soaking in 1% $CaCl_2$ and ascorbic acid have been utilized as firming agents that assist in prolonging the fruits life after harvest.

Relative electrical conductivity (REC) (%):

Generally, REC % of "Floridaprince" peach fruits is increased as the storage duration increased (Tables 14 and 15). However, the fruits soaked in distilled water (control) showed a significant increment in REC % as compared to other soaking treatment. The average values of REC % in control were 27.25 & 27.76% under cold storage conditions and 31.01 & 31.53% under ambient conditions during both seasons, respectively.

Table 14. REC (%) in "Floridaprince" peach fruits at different storage periods during the 2016 season.

Soaking solutions	Rec (%) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	15.89	17.91	20.94	32.95	21.92	15.89	21.95	24.94	36.91	24.92
1% $CaCl_2$ + 0.5% AC	15.89	18.84	22.33	37.36	23.61	15.89	22.86	26.34	41.33	26.61
1% $CaCl_2$ + 1% AC	15.89	17.23	20.21	28.20	20.38	15.89	21.20	24.23	32.24	23.39
1% $CaCl_2$ + 1.5% AC	15.89	15.92	18.91	24.93	18.91	15.89	19.93	22.91	28.92	21.91
1% $CaCl_2$ + 2% AC	15.89	19.84	23.82	43.81	25.84	15.89	23.81	27.84	47.85	28.85
Control	15.89	20.05	24.03	49.02	27.25	15.89	25.03	29.05	54.07	31.01
Mean of storage period	15.89	18.29	21.71	36.05	-	15.89	22.46	25.89	40.22	-
LSD at 5%	Soaking solutions (S) = 0.018 Storage period(P) = 0.013 S x P = 0.037					Soaking solutions (S) = 0.019 Storage period(P) = 0.015 S x P =0.038				

Table 15. REC (%) in "Floridaprince" peach fruits at different storage periods during the 2017 season.

Soaking solutions	Rec (%) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	16.39	18.45	21.45	33.45	22.44	16.39	22.43	25.44	37.46	25.43
1% $CaCl_2$ + 0.5% AC	16.39	19.36	22.84	37.83	24.11	16.39	23.36	26.85	41.87	27.12
1% $CaCl_2$ + 1% AC	16.39	17.73	20.74	28.72	20.89	16.39	21.75	24.74	32.76	23.91
1% $CaCl_2$ + 1.5% AC	16.39	16.53	19.41	25.44	19.44	16.39	20.47	23.44	29.43	22.43
1% $CaCl_2$ + 2% AC	16.39	20.33	24.34	44.35	26.35	16.39	24.34	28.36	48.38	29.37
Control	16.39	20.55	24.54	49.56	27.76	16.39	25.56	29.59	54.56	31.53
Mean of storage period	16.39	18.83	22.22	36.56	-	16.39	22.99	26.40	40.74	-
LSD at 5%	Soaking solutions (S) = 0.017 Storage period(P) = 0.014 S x P = 0.036					Soaking solutions (S) =0.016 Storage period(P) =0.012 S x P = 0.035				

As for the impact of the interaction between storage period and examined soaking solution applications, data in the same tables showed that fruits soaked in distilled water (control) followed by fruits soaked in 1% $CaCl_2$ + 2% AC solution which stored for 30 days scored the highest REC % in the two seasons but fruits soaked in 1% $CaCl_2$ + 1.5% AC introduced the lowest value in this concept. Conversely, fruits soaked in 1% $CaCl_2$ + 1.5% AC followed by 1% $CaCl_2$ + 1% AC soaking solution scored the lowest Rec% at 10 days of the storage period in the two seasons at cold storage and shelf life. The gained results are in harmony with Kozemi *et al*. (2011) who reported that diminished electrolyte leakage by calcium enhances the cell wall stability and integrity. Furthermore, El-Shazly, 2013 demonstrated that ascorbic acid is an active material for enhancing fruit firmness which leads to a decline in REC % during the storage period.

Total phenol (mg/g):

It was obvious from the data in Tables 19 and 20 that all tested soaking solution applications were effective in diminishing the total phenol of "Floridaprince" peach fruits in the two seasons. Meanwhile, the highest total phenol of "Floridaprince" peach fruits was recorded by 1% $CaCl_2$ + 1.5% AC soaking solution followed by 1% $CaCl_2$ + 1% AC soaked fruits, while the lowest values in this concept were resulted by control in the two seasons at cold storage and shelf life.

Regarding the impact of storage durations, Tables 16 and 17 indicate that irrespective of zero-day, total phenol of "Floridaprince" peach fruits was decreased as the cold storage duration was advanced from ten to twenty days. Meanwhile, "Floridaprince" peach fruits stored for thirty days recorded the lowest results as compared with storage duration for ten days in the two seasons. Total phenols reduce in "Floridaprince" peach fruits due to the oxidation of monohydric or dihydric phenols that occurs during ripening process which leads to the degradation of active phenols (Reyes *et al*., 2005) as a result of enzymatic activities occurring in the fruit (Baltacioğlu *et al*., 2011).

Concerning the impact interactions, values in Tables 19 and 20 cleared that, "regardless data of zero storage period" fruits soaked in distilled water at 30 days of storage period scored the lowest values of total phenol. On the other hand, fruits soaked in 1% $CaCl_2$ + 1.5% AC solution at 10 days of storage period scored the highest values in this concept in the two seasons. This tendency was true at cold storage and shelf life in the two seasons and go in the same line with Altunkaya and Gökmen (2008) who reported that the reduction of total phenol content is possibly due to the oxidation by polyphenol oxidase.

Table 16. Total phenol (mg/g) in "Floridaprince" peach fruits at different storage periods during the 2016 season.

Soaking solutions	Total phenol (mg/g) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	15.49	14.81	13.79	11.66	13.94	15.49	14.48	13.46	11.33	13.69
1% $CaCl_2$ + 0.5% AC	15.49	15.02	14.22	12.62	14.34	15.49	14.69	13.89	12.29	14.09
1% $CaCl_2$ + 1% AC	15.49	15.42	15.02	14.22	15.04	15.49	15.09	14.69	13.89	14.79
1% $CaCl_2$ + 1.5% AC	15.49	15.62	15.42	15.02	15.39	15.49	15.29	15.09	14.69	15.14
1% $CaCl_2$ + 2% AC	15.49	15.22	14.62	13.42	14.69	15.49	14.89	14.29	13.09	14.44
Control	15.49	14.62	13.42	11.02	13.64	15.49	14.29	13.09	10.69	13.39
Mean of storage period	15.49	15.12	14.42	12.99	-	15.49	14.79	14.09	12.66	-
LSD at 5%	Soaking solutions (S) = 0.017 Storage period(P) = 0.014 S x P = 0.034					Soaking solutions (S) = 0.015 Storage period(P) = 0.011 S x P = 0.032				

Table 17. Total phenol (mg/g) in "Floridaprince" peach fruits at different storage periods during the 2017 season.

Soaking solutions	Total phenol (mg/g) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	15.16	14.48	13.46	11.33	13.61	15.16	14.15	13.13	11.00	13.36
1% $CaCl_2$ + 0.5% AC	15.16	14.69	13.89	12.29	14.01	15.16	14.36	13.56	11.96	13.76
1% $CaCl_2$ + 1% AC	15.16	15.09	14.69	13.89	14.71	15.16	14.76	14.36	13.56	14.46
1% $CaCl_2$ + 1.5% AC	15.16	15.29	15.09	14.69	15.06	15.16	14.96	14.76	14.36	14.81
1% $CaCl_2$ + 2% AC	15.16	14.89	14.29	13.09	14.36	15.16	14.56	13.96	12.76	14.11
Control	15.16	14.29	13.09	10.69	13.31	15.16	13.96	12.76	10.36	13.06
Mean of storage period	15.16	14.79	14.09	12.66	-	15.16	14.46	13.76	12.33	-
LSD at 5%	Soaking solutions (S) = 0.015 Storage period(P) =0.012 S x P =0.031					Soaking solutions (S) =0.016 Storage period(P) =0.013 S x P = 0.033				

Anthocyanin (mg/100g):

Data in Tables 18 and 19 declare that all tested soaking solution treatments statistically decreased anthocyanin significantly of "Floridaprince" peach fruits, with preferable for control fruits as compared with other soaking solutions in both seasons. As for the impact of storage durations, the same tables show that anthocyanin of Floridaprince peach fruits decreased with prolonging the storage periods in both seasons. So, thirty days storage duration scored the lowest data in this sphere while ten days storage period "regardless of zero-day" registered the greatest data in this respect. This tendency was true in the two seasons. These results were confirmed by Conway (1987) who reported that calcium modifies extracellular and intracellular processes that delay ripening symbolized by lower rates of ethylene production and color alteration. Furthermore, ascorbic acid enhanced lightness and diminished redness color in peach fruit (Rababah *et al.*, 2005); hence, ascorbic acid is utilized to prohibit enzyme discoloration of fruits by reduction of colorless o-quinones to diphenols compound (McEvily *et al.*, 1992)

Referring to the impact of interactions, values in Tables 18 and 19 pronounced that soaked fruits in distilled water at thirty days storage duration gained the lowest results of anthocyanin in the two seasons. Reversely, fruits soaked in 1% $CaCl_2$ + 1.5% AC at ten days storage periods gave the highest values in this concept in the two seasons.

The remained combinations came in-between the abovementioned treatments in both seasons.

Overall, soaking "Floridaprince peach" fruits in 1% $CaCl_2$ + 1.5% AC solution as a post-harvest treatment for cold storage and shelf life was found to be profitable due to its role in keeping fruit characteristic during storage duration without retro-gradation in fruit quality.

Table 18. Anthocyanin (mg/100g) in "Floridaprince" peach fruit at different storage periods during the 2016 season.

Soaking solutions	Anthocyanin (mg/100g) (Season 2016)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	14.78	13.75	12.69	10.67	12.97	14.78	13.42	12.36	10.34	12.73
1% $CaCl_2$ + 0.5% AC	14.78	13.98	13.18	11.58	13.38	14.78	13.65	12.85	11.25	13.133
1% $CaCl_2$ + 1% AC	14.78	14.38	13.98	13.18	14.08	14.78	14.05	13.65	12.85	13.83
1% $CaCl_2$ + 1.5% AC	14.78	14.58	14.38	13.98	14.43	14.78	14.25	14.05	13.65	14.18
1% $CaCl_2$ + 2% AC	14.78	14.18	13.58	12.38	13.73	14.78	13.85	13.25	12.05	13.48
Control	14.78	13.58	12.38	9.98	12.68	14.78	13.25	12.05	9.65	12.43
Mean of storage period	14.78	14.08	13.37	11.96	-	14.78	13.75	13.04	11.63	-
LSD at 5%	Soaking solutions (S) = 0.019 Storage period(P) = 0.014 S x P = 0.011					Soaking solutions (S) =0.020 Storage period(P) =0.016 S x P =0.013				

Table 19. Anthocyanin (mg/100g) in "Floridaprince" peach fruit at different storage periods during the 2017 season.

Soaking solutions	Anthocyanin (mg/100g) (Season 2017)									
	Cold storage (day)					2 Days during shelf life after cold storage period				
	0	10	20	30	Mean of Soaking solutions	0	10	20	30	Mean of Soaking solutions
1% $CaCl_2$	14.45	13.42	12.36	10.34	12.64	14.45	13.09	12.03	10.01	12.395
1% $CaCl_2$ + 0.5% AC	14.45	13.65	12.85	11.25	13.05	14.45	13.32	12.52	10.92	12.80
1% $CaCl_2$ + 1% AC	14.45	14.05	13.65	12.85	13.75	14.45	13.72	13.32	12.52	13.50
1% $CaCl_2$ + 1.5% AC	14.45	14.25	14.05	13.65	14.1	14.45	13.92	13.72	13.32	13.85
1% $CaCl_2$ + 2% AC	14.45	13.85	13.25	12.05	13.4	14.45	13.52	12.92	11.72	13.15
Control	14.45	13.25	12.05	9.65	12.35	14.45	12.92	11.72	9.32	12.10
Mean of storage period	14.45	13.75	13.04	11.63	-	14.45	13.42	12.71	11.30	-
LSD at 5%	Soaking solutions (S) = 0.018 Storage period(P) =0.015 S x P = 0.012					Soaking solutions (S) =0.017 Storage period(P) =0.013 S x P = 0.010				

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تطبيقات ما بعد الحصاد بواسطة كلوريد الكالسيوم وحمض الأسكوربيك حسنت القدرة التخزينية لثمار الخوخ صنف فلوريدا برنس

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أجريت هذه الدراسة خلال موسمين متتاليين (٢٠١٦ و ٢٠١٧) لتقييم تأثير تطبيقات ما بعد الحصاد بواسطة كلوريد الكالسيوم بنسبة ١٪ وحمض الأسكوربيك بتركيزات ٠,٥ و ١ و ١,٥ و ٢٪ عن طريق النقع على بعض صفات جودة ثمار الخوخ الفلوريدا برنس. وقد تم تخزين الثمار تحت ظروف التخزين البارد (٢ ± ١ درجة مئوية و٩٠-٩٥٪ رطوبة نسبية) لمدة ٣٠ يومًا و ٢ يوم في جو الغرفة بعد كل فترة تخزين بارد (١٠ أيام). تم تسجيل مختلف الصفات الفيزوكيميائية للثمار بعد ٠ ، ١٠ ، ٢٠ ، ٣٠ يومًا من التخزين البارد وبعد يومين في جو الغرفة لكل فترة تخزين بارد. أسفرت النتائج عن زيادة فى نسبة الفقد في وزن الثمار ، نسبة المواد الصلبة الذائبة، نسبة المواد الصلبة الذائبة إلى الحموضة، ونسبة التوصيل الكهربى لمحلول الثمار في جميع المعاملات؛ في حين إنخفضت نسبة الحموضة ، فيتامين سى، الصلابة، الفينولات الكلية والأنثوسيانين مع تقدم فترة التخزين. ومع ذلك ، أشارت نتائج الدراسة إلى أن ثمار خوخ الفلوريدا برنس المنقوعة في ١,٥% أسكوربيك أسيد + ١% كلوريد كالسيوم أظهرت تأخرًا كبيرًا في تدهور الصفات المختلفة لثمار خوخ فلوريدا برنس خلال التخزين البارد أو جو الغرفة. يمكن تخزين الثمار المنقوعة في ١,٥% أسكوربيك أسيد + ١% كلوريد كالسيوم بنجاح لمدة ٢٠ يومًا في ظروف التخزين البارد ويومين في ظروف الغرفة بعد التخزين البارد بجودة حسية مقبولة للغاية.