NATURAL METHODS FOR PEACH COLOR ENHANCEMENT

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Abstract

Two treatments for improving peach color (cv. Swelling) were tried at El Marwa Farm (Cairo – Alex. desert road) in two successive seasons 2002 and 2003. Aluminum foil of 1 x 1 meter was spread on the ground under some trees and activated Jasmine oil (0.05 %) was sprayed on the others, in the first week of May. First sample was taken before treating the trees, and the second one was taken at the proper picking date in last May. Fruits were stored for one month. Physical and chemical quality parameters were estimated by the end of cold storage duration. The color Hue angle, fruit firmness, organoleptic tests, decay incidences, T.S.S., acidity percentages and anthocyanin content were estimated. The results revealed that aluminum foil caused a clear increase in peach fruit red color intensity Hue angle (43.0 and 39.0 in both seasons, compared to control 80.7 and 50.7 in both seasons respectively) and enhanced ripening, therefore it was indicated that fruits treated by using aluminum foil were softer (0.66 $Lb/inch^2$) than control fruits, on the other hand, fruits of Jasmine oil treatment had the highest firmness by the end of the storage period (3.3 $Lb/inch^2$) as compared to the control (1.76 $Lb/inch^2$). Foil treated fruits had the highest anthocyanin values (7.067 and 10.67 mg/g in both seasons) than control (2.6 and 2.8 mg/g) whereas Jasmine oil treated fruits showed lower increase in anthocyanin content. T.S.S. % in aluminum foil treated fruits gave significant results as compared to control fruits whereas; Jasmine oil treatment caused a noticeable lower increase in T.S.S. %. It is recommended to use aluminum foil sheets under trees to enhance peach fruit color and accelerate the ripening rate, also applying Jasmine oil for improved fruit color and delayed ripening.

INTRODUCTION

Peach is widely cultivated, in Egypt, with a total production of about 302.667 tons. Many traditional and newly introduced varieties have a promising potentiality (i.e. Spring Crest, Florida Sun, Swelling, Desert Red), either for local market or for exportation. Egyptian fruits, especially peach, can be very competitive in foreign and export markets, especially for early maturing varieties, providing that quality aspects are well realized. One of the most important quality aspects is color. Well colored peach fruit, especially with deep red coloration is very attractive to consumers. As peach ripens, the background color turns from green to yellow, with varying degrees of rediness or blushes. These color changes result from chlorophyl degradation (green) and the appearance and synthesis of carotenoids and anthocyanins in the peel. Both red peel and fruit coloration are associated with light availability within tree

canopy (Bible and Singha, 1993). It was found that light received during the second half of stage 3 of fruit development is very important for coloration (Seymour *et al.*, 1993). Adoption of certain practical and innovative means may help to improve peach red coloration. Reflective plastic films were used 2 – 4 weeks before anticipated first harvest, by placing down these films on the soil, and on other side of the tree saw, in the middles, yielded a certain color improvement in peach (Desmond and Rushing, 2001), in addition to an increase in total soluble solids percentage. Another practical mean, which proved to be effective in enhancing fruit quality is the application of Jasmonate compounds as preharvest treatments (Methyl Jasmonate and Jasmonic acid), which are widely accepted in stimulating peach color (Ueda, 1991), and reducing chilling injury (Feng *et al.*, 2003).

The present experiment aims at investigating the role of preharvest placement of ground Aluminum sheets between trees, in addition to the application of Jasmine oil extracts to stimulate peach color and improve quality.

MATERIALS AND METHODS

This study was carried out in two consecutive seasons, i.e. 2002 and 2003. "Swelling" variety was used. The following treatments were implemented:

1- Reflective film placement:

Aluminum reflector sheets of 1m x 1m were placed on both sides around each tree (2 bands) in a raw of 6 trees in the Marwa farm (70 km Cairo – Alex. desert road), films were placed on the ground in the first week of May.

2- Jasmine oil application (or biological treatment):

On another row of trees, four peach trees were completely asperged by an activated Jasmine oil solution (at a concentration of 0.05 %), in the first week of May and a second application was done after 2 weeks from the first one, on the same trees and by the same solution. A preliminary sample of fruit was taken before conducting any treatment at the first week of May, and the experimental and second samples of fruits were taken after 10 days from the last application of the Jasmine oil. These samples were taken from the trees subjected to treatments by aluminum sheets, and Jasmine oil treated-trees in addition to a control sample.

Quality parameter estimation:

The following quality parameters were estimated:

1- At the beginning of treatments (1st week of May), and from control trees.

2- Immediately after picking the second sample (end of May).

3- After cold storage at 0 °C.

The following parameters were estimated:

1- Color Hue angle:

Intensity of color was estimated by Hunter colorimeter (DP9000) for each fruit, and color Hue angle was calculated as "tan $^{-1}$ b/a". Color was represented by a (green – red) and b (blue – yellow) .The hue° was estimated as 0° = red – purple, 90° = yellow, 180° = blush – green, 270° = blue (McGuire, 1992).

2- Firmness: pulp firmness was measured by a hand pressure tester (Italian model) expressed in Lb/in^2 (Abbott *et al.*, 1976).

3- Total soluble solids: percentage in pulp was measured by a digital refractometer (Abbe).

4- Acidity percentage: in peach juice was estimated by titration with 0.1N Na OH and calculated as malic acid according to A. O. A. C. (1970).

5- Anthocyanin: one gram from the mixture of fruit peel was grounded with 95% ethyl alcohol and H Cl 2 %. The mixture was then filtered through centered glass funnel (G3) and the extract was transferred to 25 ml volumetric flask and completed to volume with acidified alcohol. The absorption of extracted pigment was measured at 535 mu for anthocyanin, using Spectronic 21D Spectro Colorimeter (Wettstein, 1957).

6- Organoleptic note: three persons for panel tests estimated its degree by 4 classes were graded as follows: -

Excellent (10 – 8.1), Good (8 – 6), Fair (6 – 5) and Unacceptable

(under 5).

7- Decayed fruit percentage: was estimated only in the second year (internal browning and Rhizopus). After fruits were removed from cold storage and kept for two days in ambient conditions, decayed fruits were counted for each category.

8- Statistical analysis:_ Means were compared by the L. S. D. values at 5 % level. (Snedecor and Cochran, 1990).

RESULTS AND DISCUSSION

Hue angle color:

Fruit color at start (zero time) as shown in Table 1 recorded a Hue angle of 110 (greenish yellow color) in the 1st year and 74.6 (beginning of yellowness) in the 2nd one (McGuire, 1992). After picking immediately, approx. 28 days from zero time the fruit color is transformed to more orange tint especially with aluminum foil treatment in both seasons recording an angle of 51 and 45.3 in the 1st and 2nd year, respectively, and for biological treatment fruits with values of 60.3 and 46.7 in the 1st and 2nd year, while control fruits after picking were the best colored especially in the first season. After cold storage, aluminum foil recorded a more reddish orange color in both seasons (43.0 and 39.0 in the 1st and 2nd seasons, respectively). Biological - treated fruits showed also a good orange coloration after cold storage, but slightly less than that of aluminum foils treatment. Control fruits had significantly the least orange coloration in both seasons as Hue angle after cold storage reached the value of 80.7 in the 1st season and 50.7 in the 2nd season respectively. These results are in complete agreement with those of Garnsey and Lawes (1999) for the effect of plastic mulching on color improving, and with Scbroder (1998) for the effect of Jasmonates on enhancing color development.

Anthocyanin content of peel:

Clear increase in peel anthocyanin, as shown in Table 2 was noticed, at picking time for both treatments, but aluminum foil treated fruits had the highest values in all cases. At zero time, the initial value of 2.8 mg/g increased to 6.16 mg/gm after picking and to 7.0 mg/g after cold storage for aluminum foil fruits in the 1st year showed the same trend in the 2nd year. These finding goes along with those reached by Desmond *et al.*, (2001). Biological treated fruits witnessed a lower increase in anthocyanin content in the 1st year (3.8 mg by the end of cold storage), with a pronounced higher increase in the 2nd year (7.3 mg). In all cases, control fruits color did not show any perceptible change from the start neither after picking, nor after cold storage. In this regard aluminum foil reflects more light that enhanced more color intensity.

Fruit firmness:

For the 1st season there is a significant difference between aluminum foil – treated fruits and control at the start of the experiment as the former was softer (23.7) compared to control (31.0). (Table 4, expressed in Lb/in^2) This was an indication that the fruits were reaching a more advanced stage of ripening by aluminum foil treatment, while fruits of the biological treatment (with Jasmine oil) had

the highest firmness (3.3). By the end of storage period, all fruits were softer than before, however fruits from aluminum foil treatment were the softer with a value of (0.66), compared to control fruit firmness (1.76), while the biological treatment resulted in relatively firmer fruit (3.33). These results proved that aluminum foil hastened fruit maturity, as represented by firmness, in accordance with the results obtained by Garnsey and Lawes (1999). Biological treatment was effective in delaying maturity rate that proved to be in complete accordance with known and documented Jasmonates effects, (Feng *et al.*, 2003). In the second season, fruits were generally more firm, biologically-treated fruit had the highest firmness of (21.3) after picking, and declined to a value of (1.9) after cold storage. Aluminum foil treatment had also a lower firmness (19.5) that reached the lowest firmness after cold storage (1.8), compared to control (2.1).

Decay percentage:

Although this count was done only in the 2nd year samples, (as shown in Table 7) yet it showed clearly that aluminum foil treated fruits had the highest percentage of decay (43.5 %) after 2 days in ambient conditions followed by control fruits (41 %), while the biologically – treated fruits were almost totally sound, due to the antiseptic effect of Jasmine oil as mentioned by Yan (2002).

Total soluble solids percentage in pulp:

It is clear from results shown in Table 5 that in the 1st year aluminum foil treatment resulted in fruits with a T.S.S. value of (11.7 %) after picking reaching (11.8 %) by the end of cold storage similar to control fruits. Biological treatment caused a noticeable lower increase in T.S.S. percentage of its fruits (11.3 % after picking and 11.0 % at the end of storage) compared to control fruits, having a higher value (11.8 %). In the 2nd year, aluminum foil treatment effect was more pronounced as T.S.S. start value 10.5 % reached 13.3 % for its fruits after cold storage compared to the biological treatment and control fruits which had a lower value for both (12.5 %). These results showed that peaches are prone to ripen inducing effect by aluminum foil utilization, as mentioned by Desmond *et al* (2001), and a relatively delaying maturity effect by biological treatment (Jasmine oil), supported by Scbroder (1998).

Acidity percentage:

Acidity decreased in the 1st year from a starting value of (0.48 %) for aluminum foil treatment and control to reach values of (0.39 % - 0.41 %) for both of them after picking and they stayed almost stable after cold storage. Jasmine - treated fruits had a relatively higher acidity at picking (0.5 %) indicating a certain effect for

this biological substance in delaying maturity, but after cold storage, acidity was almost similar to the other treatments, (as shown in Table 3).

Organoleptic test:

Eating quality as Judged by a panel test showed a superior taste note for aluminum foil treated fruits in both seasons (8 values of 8) compared to biological and control fruits which were just acceptable with a note of 6. Aluminum foil stimulated all phenomena of ripening in fruits (as shown in Table 6). The present results are in accordance with Eksteen (1984). Biological – treated fruits with Jasmine oil have been delayed in ripening, and their content of soluble sugars was influenced, consequently its taste grade had a lower note.

Conclusion:

Aluminum foil strips placed on the ground under peach trees one month before picking caused a distinct increase in peach fruit red color intensity and enhanced ripening. However trees aspersion by very diluted activated Jasmine oil, enhanced red coloration, but to a lower extent than aluminum foil, and in the meantime delayed ripening and kept fruits in a higher firmness and less decay susceptibility, thereby improving fit quality it is worth mentioning that such application, are the alternative way for spraying with chemicals that induce the required fruit color while are considered unsafe for human health moreover, such finding would certainly has its economical impact on the marketed fruits, not only for better fruit appearance that getting higher profit margin, but also for overcoming the lack of coloring on this variety.

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Table1. Effect of treatments on color Hue angle.

1st season					
Period	Av. At start	After picking		After one month	
Treatments	0.0 – time			at 0 °C	
Aluminum Foil	110.00	51.00	B	43.00	B
Biologic.		60.33	AB	46.67	B
Control		80.00	A	80.67	A
L.S.D at 5%	-	25.00		8.812	
2nd season					
Aluminum Foil	74.66	45.33	A	39.00	A
Biologic.		46.67	A	39.67	A
Control		49.33	A	50.67	A
L.S.D at 5%	-	11.88		13.99	

Table 2. Effect of treatments on anthocyanin (mg /g) in fruit peel.

1st season					
Period	Av. At start	After picking		After one month	
Treatments	0.0 – time			at 0 °C	
Aluminum Foil	3.7	6.167	A	7.067	A
Biologic.		3.667	B	3.833	C
Control		2.333	C	2.600	B
L.S.D at 5%	-	0.8867		0.7415	
2nd season					
Aluminum Foil	2.8	6.167	A	10.67	A
Biologic.		5.000	B	7.333	A
Control		2.67	C	2.867	B
L.S.D at 5%	-	0.3793		4.042	

Table 3. Effect of treatments on acidity % as malic.

1st season					
Period	Av. At start	After picking		After one month	
Treatments	0.0 – time			at 0 °C	
Aluminum Foil	0.483	0.39	A	0.3933	A
Biologic.		0.50	A	0.3467	A
Control		0.41	A	0.3933	A
L.S.D at 5%	-	0.1056		0.1014	
2nd season					
Aluminum Foil	0.500	0.3833	B	0.3933	A
Biologic.		0.5167	A	0.4567	A
Control		0.4000	B	0.3567	A
L.S.D at 5%	-	0.1014		0.1434	

Table 4. Effect of treatments on firmness (Lb/in^2).

1st season					
Period	Av. At start	After picking		After one month	
Treatments	0.0 – time			at 0 °C	
Aluminum Foil	37.33	23.67	C	0.6667	B
Biologic.		33.33	A	3.333	A
Control		31.00	B	1.767	B
L.S.D at 5%	-	1.851		1.254	
2nd season					
Aluminum Foil	24.00	19.47	A	1.800	B
Biologic.		21.33	A	1.933	AB
Control		20.67	A	2.100	A
L.S.D at 5%	-	4.150		0.2378	

Table 5. Effect of treatments on T.S.S. %.

1st season					
Period	Av. At start	After picking		After one month	
Treatments	0.0 – time			at 0 °C	
Aluminum Foil	9.8	11.67	A	11.77	A
Biologic.		11.33	A	11.00	A
Control		11.83	A	11.80	A
L.S.D at 5%	-	2.645		0.8267	
2nd season					
Aluminum Foil	10.5	12.67	A	13.33	A
Biologic.		11.83	A	12.50	A
Control		13.00	A	12.50	A
L.S.D at 5%	-	2.617		1.362	

Table 6. Effect of treatments on Organoleptic test.

1st season				
Period	1st year		2nd year	
	At end of storage		At end of storage	
Treatments	At 0 °C		At 0 °C	
Aluminum Foil	8.000	A	8.000	A
Biologic.	8.000	A	6.000	A
Control	6.000	A	6.000	A
L.S.D at 5%	2.267		3.584	

Table 7. Effect of treatments on percentage of decayed fruits at each treatment.

Period	2nd year	
	At end of storage	
Treatments	At 0 °C	
Aluminum Foil	43.5	± 2
Biologic.	0.8	± 0.2
Control	41.0	± 1

طرق طبيعية لزيادة تلوين الخوخ

حمدى الزيات ، هشام علام

معهد بحوث البساتين – مركز البحوث الزراعية

أجريت هذه الدراسة خلال موسمى ٢٠٠٢ & ٢٠٠٣ بإستعمال معاملتين لتحسين تلوين الخوخ (صنف Swelling) فى مزرعة المروة بطريق القاهرة – الإسكندرية الصحراوى . وتم مد رقائق الألومنيوم (١ ×١ م) على الأرض تحت الأشجار. وكذلك تم الرش بزيت الياسمين بتركيز(٠,٠٥%) على أشجار أخرى فى الأسبوع الأول من مايو . وقد أخذت العينه الأولى قبل إجراء المعاملة بينما أخذت العينه الثانية عند جمع الثمار وتم تخزينها لمدة شهر على درجة صفر م° . وقيمت خصائص الجودة الطبيعية والكيميائية للثمار (زاوية اللون – الصلابة – نسبة العفن – إختبار التذوق – نسبة المواد الصلبة الذائبة – نسبة الحموضة – محتوى الأنثوسيانين) ولقد أظهرت النتائج أن المعاملة برقائق الألومنيوم أدت إلى زيادة كثافة اللون الأحمر فى ثمار الخوخ – (زاوية اللون ٤٣ & ٣٩ على الموسمين مقارنة بالكنترول ٨٠,٧ & ٥٠,٧) . وكذلك أعطت المعاملة برقائق الألومنيوم ثمار أقل صلابة (٠,٦٦ رطل / البوصة المربعة) عن الكنترول بينما الثمار المعاملة بزيت الياسمين أعطت ثمار أعلى صلابة فى نهاية فترة التخزين (٣,٣ رطل / البوصة المربعة مقارنة بالكنترول ١,٧٦ رطل / البوصة المربعة) .

أعطت المعاملة برقائق الألومنيوم ثمار ذات محتوى عالى من الأنثوسيانين (٧,٠٦٧ & ١٠,٦٧ ملجم/ جم فى الموسمين) مقارنة بثمار الكنترول (٢,٦ & ٢,٨ ملجم / جم فى الموسمين) بينما كانت الزيادة أقل بالنسبة للمعاملة بزيت الياسمين . نسبة المواد الصلبة الذائبة فى الثمار المعاملة برقائق الألومنيوم كانت متشابهة مع ثمار الكنترول بينما الثمار المعاملة بزيت الياسمين كانت أقل .

ويوصى بإستخدام المعاملة برقائق الألومنيوم تحت الأشجار لزيادة تلوين ثمار الخوخ وإسراع النضج نسبيا وكذلك المعاملة بزيت الياسمين لتحسين التلوين مع تأخير النضج .