

EFFECT OF PICKING DATE ON YIELD AND FRUIT QUALITY OF "WASHINGTON NAVEL" ORANGE TREES

Ibrahem, A.M.

Hort., Res., Inst. Agric. Res. Centre. Cairo, EGYPT

ABSTRACT

The present investigation was carried out during the two successive of 2009/2010 and 2010/2011 seasons on Washington Navel orange trees grown at El-Shohada farm, El-Menofeia Governorate of Egypt in order to study the effect of five different harvesting date on the yield, fruit quality and successive yield. In the first season, twenty trees were chosen and divided into 5 groups representing 5 Picking dates (treatments). The picking dates were 15 Dec., 15 Jan., 15 Feb., 15 Mar., and 15 Apr., Each treatment was replicated times (four trees), in a randomized complete block design. However, in the second season, another trees were chosen and followed the same procedures as in the first season. The yield as number or weight of fruits / tree was recorded for each tree. The results showed that delaying harvest date from 15 Dec. to 15 April., total yield as number or weight of fruit / tree has decreased. Moreover, fruit creasing percentage, average fruit weight, fruit diameter, peel thickness, were increased with declaring leanest date, however the fruit juice % was decreased.

Keywords: Navel orange, creasing, harvesting date, fruit quality, yield, peel thickness.

INTRODUCTION

The citrus fruit of genus citrus are including sweet oranges, grape fruits, mandarins, lemons, limes, chukotra, sour orange, rough lemon, kinnow and citron. It is a special type of berry named hesperidium. It is called so due to the presence of hesperidium, a vitamin like substance. Citrus fruits are highly nutritious having vitamin A, B and C and also contains appreciable amount of other minerals (Saunt, 1990).

In Egypt, citrus acreage reached 382,986 feddan, where sweet oranges (*Citrus sinensis* L.) resembling 62.2% of the total citrus acreage with lower productivity than those of the frontline growing countries like China, USA, Spain and Italy (30 to 35 ton/ha). Due to the future wide exportation of Valencia orange, its cultivation area reached 65160 feddan with average 10.13 ton/feddan. Most acreage located in newly reclaimed areas (Ministry of Agric. & Land Reclamation, Egypt, 2010). Most of navel orange acreage (116776 feddans) is located in Behra, Kaluobeia, Sharkeia and Menofeia Governorates (Economical & Agricultural Bulletin, 1997). Citrus is the backbone of fruit crop cultivation in Egypt. During the last few years, citrus area has increased due to increasing demands of local consumption and exports, which is expected to boom in the future. Such extension in area encourages establishing more studies towards finding out an appropriate integrated N management for improving the production and fruit quality (Wardowshi *et. al.*, 1986)

Under Egyptian marketing conditions, the mature navel orange fruits are stored on the tree until the time of flowering of the following season, yield and fruit quality. The effect of picking date of some orange cvs on yield and fruit quality has been investigated by (Dundar and Pekmezci, 1991) , (Abdi and Mojdeh 1992), (Qing ShangMo, 2010) , (Han ShuRui et. al., 2014),

The main of this study was to investigate the effect of harvest dates on yield and fruit quality "Washington navel" orange trees.

MATERIALS AND METHODS

This study was carried out on "Washington navel" orange trees (*Citrus sin ensis* L. Osbeck.) grown in a private farm at El-Shohada. Menofeia Governorate during 2009 / 2010 and 2010 2011 seasons. The trees were twenty years old, grafted on Sour orange stock and planted at five meters apart. Trees were almost uniform in vigour and yield and received similar agricultural practices.

In the first season (2009), twenty trees were chosen and divided into 5 groups representing 5 Picking dates (treatments). The picking dates were 15 Dec., 15 Jan., 15 Feb., 15 Mar.; and 15 Apr. Each treatment was replicated times (four trees), in a randomized complete block design, However, in the second season (2011) another trees were chosen and the same procedures were adopted as Previously mentioned in the first season.

At each picking date, the fruit creasing % was calculated and recorded as follows-

$$\text{Fruit creasing \%} = \frac{\text{Number of creased fruits}}{\text{Total numbers of fruits / tree}} \times 100$$

Yield as number or weight of fruits / tree was recorded for each tree. Data obtained were statistically analyzed and the multiple range test at 5% level was used to differentiate means (Duncan, 1955).

Also, total yield expressed as number or weight of fruits / tree was recorded, Twenty fruits per each replicate were used for measuring average weight (g) and diameter (cm), peel thickness (cm) and juice %. Fruit chemical properties i.e. titratable acidity (as g. citric acid / 100 ml juice) and ascorbic acid content (as mg / 100 ml juice) were determined according to AOAC., (1980). Total soluble solids% was measured by a hand refractometer and T.S.S. / acid ratio was calculated.

RESULTS AND DISCUSSION

1. Effect of picking date on the yield, creasing % and some properties of fruits.

Table 1 showed that the total first season per tree as number of fruits decreased as the time of picking was delayed. However, in the second season, the total yield as a number of fruits/ tree increased on 15th of January and tended to decline later in the end of the season.

Also, table 1 indicates that the highest total yield /tree as fruit weight obtained when fruits were picked on 15th February (first season) or 15th January (second season). Whereas, the total yield / kg were slightly affected by the other picking date.

Also, data in table 1 demonstrated that the percentage of fruit creasing in the first season increased significantly as the time of picking was delayed, where the maximum creasing percentage was observed on the 15th of April. Also, the same finding was observed in the second season, where the highest creasing percentage was observed on the 15th of April. In this respect, (Abdi & Mojdeh 1992) reported that delaying pick of navel orange increased fruit percentage.

Regarding of the fruit weight, the data showed an evident increase as picking date was delayed, with no differences between different picking dates. These findings are similar to those found by (Fekreia, 1990) on orange fruits.

Table (1): Effect of picking date on yield, Creasing and some fruit physical properties of "Washington novel" orange during fist season (2009/2010) and second season (2010/2011).

Picking Date	Yield / tree		Fruit creasing %	Fruit weight (g)	Fruit Diameter (cm)
	No. of Fruits	Weight (kg)			
First Season					
15 Dec	628a	99 ab	0.3c	157.6e	6.6b
15 Jan	618a	92 bc	1.0c	158.6de	6.8b
15 Feb	601b	105a	1.5c	174.7a	7.0ab
15 Mar	580c	98 ab	4.0b	170.7ab	7.4a
15 Apr	564b	95 b	8.0a	168.4bc	7. 5a
Second season					
15 Dec	450 b	75 bc	0.3c	166.7b	7.4b
15 Jan	474a	87a	2.0c	183.5a	7.7ab
15 Feb	430c	81ab	3.0c	182.4a	7.9ab
15 Mar	425c	80ab	10.0b	188.2a	8.3a
15 Apr	421c	70c	19.0a	166.3b	8.2ab

Values within a column in each season having the same letters are not significantly different according to Duncan s multiple range test at 5% level.

Table (2) demonstrated that an evident increase in peel thickness as picking date was delayed. However, the fruit juice percentage slightly affected with different picking dates, but the highest fruit juice percentage was obtained with fruits picked on 15 Feb., (first season) and 15 Mar., (second season.). Also, the results showed an increase in total soluble solids and a decrease in titratable acidic, were obtained with delaying picking date. This reduction in titratable acidity could be attributed to the consumption of acids in respiration. T.S.S / acid ratio was increased with delaying picking date due to the decrease in titratable acidity in previously discussed. However, ascorbic acid content was not affected significantly by the date of harvest.

The effect of picking date on fruit quality was investigated by (Zayan *et. al.*, 1986), (Abdi and Mojdeh, 1992), (El-Hammady, 2000) and (Muhammad *et.al.*, 2012). They reported that delaying picking date of navel orange gave lower acidity and increased vitamin C and T.S.S / acid ratio.

Table (2): Effect of picking date on some fruit properties of “Washington navel” orange, during first and second seasons.

Picking date	Peel thickness (cm)	Fruit juice (%)	Total soluble solids (%)	Titratable acidity (%)	T.S.S/ acid (ratio)	Ascorbic acid (mg/100 ml juice)
First season						
15 Dec	0.50 c	42.3b	12.6a	1.09 a	11.56c	49.0bc
15 Jan	0.58bc	44.1b	12.9a	1.10 a	11.73c	49.2bc
15 Feb	0.68ab	55.9a	13.6a	1.03 a	13.20bc	51.1 b
15 Mar	0.70 a	43.2b	13.6a	0.77 b	17.66ab	53.2a
15 Apr	0.72a	40.1b	13.7a	0.64b	21.41a	50.5b
Second season						
15 Dec	0.53 c	42.5b	12.1a	0.99 a	12.22b	50.3a
15 Jan	0.61bc	44.9b	12.83	0.87 b	14.71bc	49.10ab
15 Feb	0.70 b	46.6b	13.8a	0.98 ab	14.09bc	42.2c
15 Mar	0.71 b	55.0a	13.9a	0.88bc	15.80ab	50.3a
15 Apr	0.74 a	45.1b	14.0a	0.84d	16.67a	48.0b

Values within a column in each season having the same letters are not significantly different according to Duncans multiple range test at 5 level

REFERENCES

- Abdi, N. and H. Mojdeh (1992). Effect of different harvesting times on citrus quality of Satsuma, Clementine mandarin and Thomson navel sweet orange in Sari. Proceeding of the International Society of Cariculture. vol. 1, Italy 8-13 Mar. 1992 (Hort. Abst. 65, 6508).
- A. O.A. C. (1980). Association of Official Analytical Chemistry Chemists, Method of Analysis 13th Ed. Washington D.C.
- Duncan, B.D. (1955). Multiple range and multiple F test. Biometrics, 11: 1-42.
- Dundar, O. and M. Pekmezci (1991). Investigation on the effects of different harvest times and storage conditions on the storability of the sweet orange cultivars Valencia and Kozan verb. Daga, Turk Tarmive Ormancilik Dergisi 15 (3): 603-612. (Hort. Abst. 64: 4027).
- El-Hammady, A. M.Abdel-Hamid, N.Nageib, M. Salah, A.,(2000): Effect of harvest date on yield, quality and successive yield of "Washington Navel" orange trees. Arab Universities Journal of Agricultural Sciences; 2000. 8(3):767-777. 15 ref.
- Economical Agricultural Bii1etj (1997). Department of statistics of Agriculture and land Reclamation of Egypt. Part 2Pi8l.
- Fekria, H.S.K. (1990). Studies of storage of Navel orange. Ph.D thesis Hort. Dept. Fac. Of Agric., Cairo Univ. Egypt. pp 80-110.

- Han ShuRui Chen Ming Chen ChuYing Fu YongQi Chen JinYin ,(2014):
Effects of different harvest dates on fruit quality and storability of
Nanfeng mandarin. Acta Agriculturae
UniversitatisJiangxiensis; 36(2):285-289.
- Ministry of Agric. & Land Reclamation, Egypt, 2010
- Muhammad Iqbal Khan, M. N. Muhammad Zafar MuhammadMunir(2012):
Effect of harvesting date on fruit size, fruit weight and total
soluble solids of Feutrell's early and Kinnow cultivars of Madarin
(Citrus reticulata) on the economic conditions of farming
community of Faisalabad.Sarhad Journal of Agriculture;
28(1):19-21.
- Qing ShangMo Chen KeLing Zeng JieMei He Jian Yang QingYi Zhu
XuRong Liao QingQing (2010). Effects of different harvest time on the
storability and fruit quality of citrus cultivar Shiranui Tangar.
South China Fruits; (2).
- Saunt, J. (1990). The lime citrus varieties of the World. Sinclair Int,1. Ltd.,
Norwich. 103 P.
- Soto, O.M. ; E.JJi Espinosa and V.C. Almaguer (1994). Out- of season
harvest of orange (Citrus sinensis L.) Osbeck. Cv. "Washington navel"
in E1-Progres SO, in the municipalit of tanage de Doria, Hgo. Revista
chapingo. Serie. ture I (2) 187-190. (Hort. Abst. 65, 4496).
- Wardowshi, W .F., S. N agy and W . G riespn, 1986.Fresh citrus fruits.
Macmillan publishers, pp: 571.
- Zayan, M.A ; A.M. Attalla and A.F. El-Sammak (1986). Effect of time of
harvest on time of flowering, fruit set. vied. fruit size and creasing in
'Washington navel" orange trees. J Agric. Res., Tanta Univ, 12 (3) :
833-846.

دراسة تأثير مواعيد القطف للبرتقال بسره على جودة الثمار و المحصول

علي محمد إبراهيم

قسم بحوث الموالح - معهد بحوث البساتين - مركز البحوث الزراعية

اجريت هذه الدراسة خلال الموسمين المتعاقبة ٢٠١٠/٢٠١١، ٢٠٠٩/٢٠١٠،
على أشجار البرتقال أبو سره واشنطن نمت في مزرعة الشهداء بمحافظة المنوفية - مصر.
وذلك لدراسة تأثير خمسة مواعيد حصاد مختلفة على الناتج، وجودة الثمار والعائد على
التوالي. ، ولقد تم اختيار عشرين شجرة في الموسم الأول وتقسيمها إلى ٥ مجموعات تمثل
٥ مواعيد قطف وكانت مواعيد القطف ١٥ ديسمبر، ١٥ يناير، ١٥ فبراير ، ١٥ مارس،
و ١٥ أبريل، تم تكرار العلاج في تصميم قطاعات عشوائية كاملة، ولكن في الموسم
الثاني وقد تم اختيار أشجار أخرى وتتبع نفس الإجراءات المتبعة في الموسم الأول. ولقد تم
تسجيل وزن الثمار لكل شجرة. وأظهرت النتائج أن على تأخير موعد الجمع من ١٥ ديسمبر
حتى ١٥ أبريل، سبب تناقص عدد الثمار ووزن المحصول الكلي للشجرة بسبب زيادة تساقط
ما قبل الجمع بينما زادت متوسط وزن الثمرة ولكن مع تأخير موعد الجمع تزداد نسبة تبخير
الثمار وسمك القشرة بينما تناقصت نسبة العصير والحموضة في الثمار.