Comparison of Some Thinning Methods on Vegetative Growth, Yield and Yield Components of "Desert Red" Peach Cultivar.

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ABSTRACT

This study was carried out during two successive seasons 2004 and 2005 at a commercial orchard at El-Nubaria, Behera, Governorate on "Desert Red" peach cultivar. Trees were sprayed at full bloom with NAA 20, 30 ppm and 2%, 3% urea and 15 cm, 20 cm hand thinning. Results revealed that, chemical thinning with NAA and urea and both hand thinning treatments increased the shoot length and leaf area in both seasons. Total leaf chlorophyll and carbohydrate were not affected significantly with the NAA and hand thinning treatments, while, urea spraying significantly increased the total chlorophyll and total carbohydrate. Furthermore, the chemical thinning and hand thinning treatments caused a general decrease in retained fruit percentages and decrease yield per tree as number of fruits per tree and yield (kg/tree). All thinning treatments increased fruit weight, seed weight, pulp weight and fruit dimensions (cm). As for fruit firmness, data showed that NAA and hand thinning reduced firmnesses, while urea treatments produced firmer fruits. In general, all treatments increased total soluble solids and TSS/acid ratio, while decrease acidity percentages. On the other hand, urea not affect acidity percentage. Data also, revealed that, Vit C content was increased with increasing concentrations of urea compared with remainder treatments. At the same time, all treatments increased total sugar, total carotene and total anthocyanin in fruits. Foliar application of NAA and hand thinning treatments in both experimental seasons decreased the total phenol percentages in fruit, while urea did not significantly effects on total phenol percentages as compared with control treatments.

INTRODUCTION

Peach (*Prunus persica* L.Batsch) belongs to the family '*Rosaceae*' originated in China. Peach is considered one of the most important fruits in the world (**Childer, 1978**).

Some early, mid and late-season low-chilling peach cultivars such as Flordasun, Florda Beauty, Desert Red, Early Grand, Almoge, Tropical. Snow, Florda prince and Swelling were introduced in the last several years, mainly from the USA by Agricultural Development System (**ADS Reports, 1982, 1983, 1984 and 1986 and Mansour *et al.*, 1982; Stino *et al.*, 1982 and Shaltout, 1987 and 1995**). These cultivars are early maturing and are available in the local market at high prices.

The highly fruit setting clearly observed in peach trees is considered to be the main reason in producing a lot of small size fruits with low or poor quality. Thus, fruit thinning is done to reduce limb breakage, increase fruit

size and improve its colour and quality, to stimulate floral initiation for next year's crop and increase the effectiveness of pest control program. Growers could increase the economic efficiency of peach production if reliable chemical thinning agents were available (**Daniel, 1988**). Hand thinning is one of the most expensive task (**Mizelle and Westberry, 1989**). Thinning agents could, also optimize the physiological efficiency of peach trees by reducing flower and fruit density, thus fruit size is increased by thinning with least reduction of damage.

Thinning could be achieved either by hand or chemically. Chemical thinning of some peach cultivars was evaluated by **Zilkah *et al.* (1988), Byers and Marini (1994), Muthoo and Chetan (1997), Ezz and El-Kobbia (2000), Abd El-Megeed (2001), and Fathi *et al.* (2002)**.

Peach thinning is connected with profitable peach growing. It improves fruit colour and quality as indexed by fresh weight per fruit, fruit diameter, total soluble solids and TSS/acid ratio (**Abd-El-Megeed, 2001**).

So, this work was carried out on 'Desert Red' peach cv. to study the effect of NAA, urea and hand thinning treatments on shoot length, leaf area, leaf chlorophyll, leaf carbohydrate, retained fruit, yield (as No. of fruits and as kg per tree) and fruit quality.

MATERIALS AND METHODS

This study was carried out during two successive growing seasons (2004 and 2005) at a commercial orchard located at El-Nubaria, Behera Governorate on 7- year – old 'Desert Red' peach trees (*Prunus persica* L. Batsch) on 'Nemagurd' peach rootstock. The trees were as uniform as possible, planted at 5 x 5 m apart and growing in sandy soil (Physical and chemical soil are presented in **Table 1**) under drip irrigation system and received similar cultural practices, adapted in the district.

Table (1): Physical and chemical analysis of the experimental soil.

Soil depth	Texture	pH	E.C. ds/m	Total $CaCO_3$ (%)	O.M. (%)	Soluble cations (meq/L)			Soluble Anions (meq/L)		
						Ca^{++}	Mg^{++}	K^{+}	HCO_3^-	Cl^-	SO_4^-
0 – 40	Sandy	7.49	2.03	3.41	0.26	18.58	10.98	1.01	6.35	31.25	7.9

Trees were sprayed at full bloom (17 February 2004 and 15 February 2005, respectively) with the following solutions: NAA at 20, 30 ppm and 2%, 3% urea, while two hand thinning treatments 15 and 20 cm aparts between

fruits were carried 10 days after fruit set. Control trees were hand thinned about 10 days after fruit set, leaving about 5-10 cm between each fruit.

Twenty-eight healthy peach trees nearly uniform as possible in growth vigor and productivity were chosen for this study. Seven thinning treatments were arranged in a randomized complete block design and each treatment was replicated four times. Each replicate consisted of an individual tree.

Four main branches as similar as possible were chosen at the four cardinal points of each treated tree, tagged and the average of the current shoot per selected branch was counted, the lengths were measured with (cm) on October, in both seasons. Leaf area was determined using leaf area meter (Model CL-203, CID, Inc, and U.S.A.).

In late May, leaf chlorophyll reading was recorded and the average of ten reading was taken on the middle of leaves from all over the tree circumference using Minolta SPAD chlorophyll meter model **(Yadava, 1986)**. The samples of leaves were washed carefully with tap water and distilled water, dried at 70 °C to constant weight and ground to determine total leaf carbohydrates according to the procedure outlined by **Malik and Singh (1980)**.

Four branches per tree were used to calculate the percentage of retained fruit. At harvest time, i.e. late May yield of each treatment was recorded as number of fruits per tree and yield weight was estimated by the multiplying number of fruits x average weight of fruit.

Twenty mature fruits of each treatment were taken to determine the fruit characteristics including the average fruit weight (gm), seed weight (gm), pulp weight (gm) and fruit dimensions (cm). Fruit firmness was measured at two opposite sides on the equator of each fruit (skin removed) using pressure tester at 5/16 plunger **(Magness and Taylor, 1925)**. In fruit juice, total soluble solids percentages (TSS %) was determined using a hand refractometer.

Total acidity was estimated as malic acid and vitamin C content was determined using 2,6-dichlorophenol indophenol dye according to the A.O.A.C. (1980). Carotene (mg/100g fresh weight) was colorimetrically determined according to the procedure outlined by **Wensttein (1957)**. Anthocyanin was determined (mg/100g fresh weight) according to **Rabino *et al.* (1977)**.

Total sugar content was determined according to the procedures outlined by **Malik and Singh (1980)**. Total phenols were determined according to A.O.A.C. (1980). All obtained data were statistically analyzed according to **Steel and Torrie, (1980)** and LSD test at 0.05 levels was used for comparison between treatments.

RESULTS AND DISCUSSION

Vegetative growth measurements:

Data in **Table (2)** concerning the effect of different thinning treatments on shoot length and leaf area of 'Desert Red' peach trees, revealed that the differences among all NAA treatments and the control were not significant in both seasons, while urea treatments significantly affected the shoot length comparing with both NAA and control treatments in both seasons. In general, all thinning treatments gradually increased the shoot length and leaf area as compared with control treatment in both seasons. Also, hand thinning at 20 cm showed an increment in the shoot length and the leaf area in both seasons comparing with control. Both urea treatments generally gave the best results for shoot length and leaf area. These results are in parrellel with those obtained by **Fallahi (1997), Byers (1999), El-Beacy (2001), Fathi *et al.* (2002) and Ahmed (2005),** on peaches. They all concluded that shoot length and leaf area were increased with all chemical and hand thinning treatments and there were a positive relationship between the leaf area and the shoot length. On apple, **Attala (1997)** and **Yuan and Greene (2000a)** also, showed that, hand and chemical thinning increased leaf area and shoot length, respectively.

Leaf chlorophyll and total carbohydrate contents:

Data in **Table (2)** showed that, in both seasons, total chlorophyll was not significantly affected NAA and hand thinning treatments as compared with the control. On the other hand, urea treatments increased leaf chlorophyll as compared with control treatment but the differences were not statistically significant. The same trend was found in both seasons with total leaf carbohydrate .Also, the data showed that hand thinning treatments resulted the highest leaf carbohydrate in both seasons as compared with other remained treatments. These results are in agreement with those obtained by **Scholtens and Westerlaken (1987), Muthoo and Chetan (1997), Farmahan and Dhiman (1998), El-Beacy (2001) and Ahmed (2005).** They all reported that all thinning treatments as compared with unthinned trees, showed slight increase in the total leaf chlorophyll and carbohydrate contents and improved fruit quality compared with the control.

Retained fruit percentages and yield/tree:

Regarding the effect of different thinning treatments on retained fruit percentages of 'Desert Red' peach trees, data in **Table (3)**, revealed that all thinning treatments decreased significantly the percentages of retained fruit as compared with control trees in both experimental seasons. Also, data

showed that hand thinning treatments (15 and 20 cm) gave the lowest retained fruit percentages in both seasons. The highest concentrations of NAA and urea (30 ppm NAA and 3% urea) also, gave the lowest retained fruit percentages as compared with the lowest concentrations (20 ppm NAA and 2% urea). These results are in agreement with those obtained by **Hatzeharise (1984), Zilkah *et al.* (1988), Modic, (1989), Bound *et al.* (1993), Southwick *et al.* (1995), Hassanein (1997), Farmahan and Dhiman (1998), Ezz and El-Kobbia (2000) and Abd El-Megeed (2001),** They all found that the application of chemical thinning at full bloom had the greatest thinning effect.

Regarding the effect of chemical and hand thinning treatments on number of fruits per tree, the data are illustrated in **Table (3)**. The results revealed that all treatments reduced the number of fruits per tree, as well as, yield kg/ tree than the control trees in both seasons.

Moreover, data in **Table (3)** showed that, spraying trees with both concentrations of NAA, urea and both hand thinning treatments significantly decreased the number of fruits, as well as, yield comparing with control trees. No differences were found among two concentrations of urea as affected on yield kg/tree. Also, data showed that, in spite of, all thinning treatments decreased number of fruits and yield, yield produced was the high marketable fruits. The reductions in yield with urea treatments in both seasons may be attributed mainly to the higher fruit abscission and this may be due to their damaging effect on the flowers and these results agreed with those found by **Blanko (1987), Abdel-Hamid (1999), and Ezz and El-Kobbia (2000).** On the contrary, **Southwick *et al.* (1995)** reported that fruit production was the same with thinning and unthinning trees. In both experimental seasons, spraying trees with NAA at 30 ppm and both urea concentrations caused a significant decrease in yield kg / tree as compared with control trees, expect the 20 ppm NAA and 20 cm hand thinning treatments in the first season.

Physical fruit quality:

Data c^{f} both seasons concerning the effect of different NAA, urea and hand thinning treatments on the main fruit characteristics i.e fruit, seed, pulp weight and fruit length and fruit diameter in 2004 and 2005 seasons are illustrated in **Table (4)**. It was noticed that, chemical thinning and hand thinning, generally increased the fruit, seed and pulp weight as compared with control treatment in both seasons. Also, the results cleared that hand thinning with 15 cm or 20 cm treatments increased significantly the fruit, seed and pulp weight in both seasons comparing with all remained treatments.

On the other hand, spraying trees with 20 ppm NAA treatment did not influence significantly on the seed weight in the second season in comparing with control trees. These results are in coincidence with illustrated by **Mihaoscu and Tertecel (1980), Shaltout (1987) and Zilkah *et al.* (1988), Mehanna (1992), Hassanein (1997), Ezz and El-Kobbia (2000) and Abd El-Megeed (2001).** They all reported that chemical or hand thinning increased significantly fruit, seed and pulp weight.

The effects of chemical thinning (NAA and urea) and hand thinning treatments on fruit dimensions are documented in **Table (4).** It was noticed that, hand thinning at 20 cm gave the highest values of fruit length and diameter in both seasons (5.87 and 5.85 cm in length, 6.34 and 6.51 cm in diameter at first and second seasons, respectively). Moreover, spraying urea at 2% and 3% at full bloom also significantly increased the fruit length and diameter in both seasons as compared with unsprayed trees. No significant difference was found in the fruit length and diameter between the 20 ppm NAA and 2% urea in one hand, and between 30 ppm NAA and 3% urea on the other, in both experimental seasons. It can be mentioned from the above data that hand thinning treatments gave the largest fruits, followed by NAA 30 ppm and urea 3%, while the control, NAA 20 ppm and urea 2% treatments gave the lowest fruit size. The previous results of **Sherman *et al.* (1982), Shaltout (1987), Hassenien (1997), Ezz and El-Kobbia (2000), Abd El-Megeed (2001) and Fathi *et al.* (2002),** are in line with the present results, while disagree with data reported by **Erez (1975).**

Chemical fruit quality:

Fruits firmnesses:

Data presented in **Table (5)** revealed that the control trees and the 2% or 3% urea treatments gave the firmer fruits than the remainded treatments which gave softer fruits in both seasons. These results were in conformity with those reported by **Southwich *et al.* (1995), Stephen *et al.* (1996) and Hassenien (1997).** They concluded that the hand thinning treatments produced fruits softer than chemical thinning treatments. The increment in the fruit firmness produced by application of urea might be due to that the urea caused a decrease in fruit total soluble pectin **(Klerk and Mollendorff, 1994, Abdel-Hamid, 1999 and Ezz and El-Kobbia, 2000).**

Total Soluble Solids (TSS %):

As for the total soluble solids, data in **Table (5)** revealed that hand thinning treatments significantly increased the TSS (%) in fruit juice as compared with all other treatments in both experimental seasons. Moreover, data showed that all thinning treatments, generally, increased

the TSS (%) as compared with control treatment in both seasons. The same results observed by **Bajwa and Singh (1970), Khalil and Stino (1987), Brooks *et al.* (1993), Hassanien (1997), Farmahan and Dhiman (1998) and Ezz and El-Kobbia (2000).**

On the other hand, **Stephen *et al.* (1996)** mentioned that TSS (%) in peach fruit was not affected as a result of hand or chemical thinning compared with unthinning trees.

Acidity (%):

Regarding the effects of different thinning treatments on acidity (%) in fruit juice data illustrated in **Table (5)** revealed that, the juice of fruits of control trees have largest acidity (%) as compared with all thinning trees, except trees sprayed with 2% and 3% urea treatments in both seasons. It was obvious that, both hand thinning treatments gave the lowest values of juice acidity. These results are in agreement with those reported by **Sharma (1981), Selli and Sansavin (1995), Hassanein (1997), Muthoo and Chetan (1997) and Abd El-Megeed (2001).** They all concluded that hand or chemical thinning treatments reduced fruit acidity than those from unthinned trees.

TSS/acid ratio:

TSS/acid ratio did not follow a constant trend was in the different thinning treatments in both seasons. Generally, hand thinning gave the largest and significant TSS/acid ratio as compared with other treatments in both experimental seasons. **Kabbel *et al.* (1999)** and **Yuan and Greene (2000b)** on apple trees, noticed that hand or chemical thinning increased the TSS/acid ratio as compared with unthinning trees.

Vitamin C:

Data in **Table (6)** showed the effects of different thinning treatments on Vitamin C content in fruit juice. It was noticed that spraying trees with 2% and 3% urea increased significant the Vit.C in juice of fruits as compared with all other treatments in both seasons. At the same time NAA in both concentrations and hand thinning treatments did not significantly effects on Vit.C as compared with control treatments in both seasons. The same results was found by **Ezz and El-Kobbia (2000) and Abd El-Megeed (2001),** the present results were not in harmony with those found by **Muthoo and Chetan (1997) and Farmahan and Dhiman (1998).**

Total sugar percentages:

Data presented in **Table (6)** revealed that all chemical and hand thinning treatments increased total sugar in fruits in both experimental seasons as compared with control fruits. Furthermore, it was noticed that

hand thinning treatments gave the highest total sugars in the fruits. At the same time, no significant difference was found in the total sugar content between 2% and 3% urea in one hand, and between 20 ppm NAA and 30 ppm NAA treatments on the other in the second season. Data of **Ezz and El-Kobbia (2000)** showed increases in the total sugar content in peach fruits. Also, the same trend was reported by **Modic, (1989), Durner *et al.* (1991), and Muthoo and Chetan (1997)** on peaches and nectarines.

Total phenol percentages:

Results of the present investigation revealed that, using foliar application of NAA, urea and hand thinning treatments in both experimental seasons, decreased the total phenol percentages in fruits as compared with control treatment **(Table 6)**. Significant differences were found between NAA and hand thinning treatments in total phenol percentages in both seasons as compared with control treatments. On the other hand, application of urea at 2% or 3% did not significantly affect the total phenol percentages in both seasons as compared with control treatment. These results are in agreement with those obtained by **Paulson *et al.* (1980), Ezz and El-Kobbia (2000), and Abd El-Megeed (2001)**, working on peaches.

Total carotene:

As for the effect of the different thinning treatments either the chemical or hand thinning treatments, data in **Table (6)** revealed that all thinning treatments significantly increased total carotene in fruits as compared with control in both seasons. The highest total carotene was found in hand thinning treatments in both seasons followed by NAA 20 ppm or 30 ppm treatments. These results are confirmed by those of **Zilkah *et al.* (1988), Casper and Taylor (1989), Byers (1990) and Abdel-Hamid (1999)** on peaches.

Anthocyanin contents:

As for the effect of the different thinning treatments on anthocyanin content, data in **Table (6)** revealed that, gradually increased in anthocyanin contents were found with all thinning treatments as compared with control treatment in both seasons.

Furthermore, data showed that the spraying of NAA at 20 ppm and 30 ppm and hand thinning treatments significantly increased the anthocyanin content in fruits as compared with control fruits in both seasons. No significant differences were found in anthocyanin content among two concentrations of NAA 20 ppm and 30 ppm, 2% and 3% urea and 15 cm and 20 cm hand thinning in both seasons. The same results were reported by **Muthoo and Chetan (1997), Farmahan and Dhiman (1998) and Ezz and El-Kobbia (2000),** on peaches.

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Table (2): Effect of some different thinning treatments on shoot length, leaf area, leaf chlorophyll and total leaf carbohydrates of "Desert Red" peach cultivar trees during 2004 and 2005 seasons.

Treatments	Shoot length (cm)			Leaf area (cm^2)			Leaf chlorophyll (SPAD reading)			Total leaf carbohydrates (%)		
	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean
Control	37.54	39.14	38.34	28.67	30.54	29.61	41.21	41.46	41.34	7.48	8.14	7.81
NAA 20 ppm.	37.67	39.47	38.57	30.01	31.12	30.57	41.47	42.01	41.24	7.50	8.08	7.79
NAA 30 ppm.	38.82	40.83	39.83	30.87	31.47	31.17	41.85	42.18	42.02	7.49	8.15	7.82
Urea 2%	40.07	42.19	41.13	30.68	32.18	31.43	42.75	42.89	42.82	7.56	8.20	7.88
Urea 3%	42.91	43.23	43.07	30.92	32.76	31.84	43.27	43.78	43.53	7.62	8.53	8.08
Hand thinning 15 cm.	38.85	40.87	39.86	31.92	33.95	32.94	41.98	42.68	42.33	7.67	8.71	8.19
Hand thinning 20 cm.	39.55	41.32	40.44	33.87	36.62	35.25	41.65	42.86	42.26	7.70	8.69	8.20
L.S.D. 0.05	1.65	1.70	–	1.65	1.95	–	1.27	1.15	–	0.05	0.08	–

Table (3): Effect of some different thinning treatments on retained fruit (%), number of fruits per tree and yield (Kg/tree) of "Desert Red" peach cultivar trees during 2004 and 2005 seasons.

Treatments	Retained fruit (%)			Number of fruits per tree			Yield (Kg/tree)		
	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean
Control	73.50	73.06	73.28	818	865	841.5	62.5	70.0	66 25
NAA 20 ppm.	69.66	68.13	68.90	765	784	774.5	60.40	66.02	63.21
NAA 30 ppm.	66.02	64.35	65.19	708	747	727.5	59.08	66.76	62.92
Urea 2%	67.36	66.53	66.95	727	763	745.0	58.39	65.48	61.94
Urea 3%	63.59	61.82	62.71	698	716	707.0	58.81	64.63	61.72
Hand thinning 15 cm.	48.28	49.16	48.72	596	605	600.5	59.92	62.76	61.34
Hand thinning 20 cm.	31.14	31.91	31.53	509	517	513.0	62.25	62.89	62.57
L.S.D. 0.05	3.83	3.72	--	26.63	15.48	--	2.46	1.86	--

Table (4): Effect of the different thinning treatments on some physical characteristics of "Desert Red" cv. peach trees during 2004 and 2005 seasons.

Treatments	Fruit weight (gm)			Seed weight (gm)			Pulp weight (gm)			Fruit length (cm)			Fruit diameter (cm)		
	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean
Control	76.41	80.92	78.67	4.02	4.26	4.14	72.39	76.66	74.53	5.32	5.45	5.39	5.47	5.63	5.55
NAA 20 ppm	78.96	84.21	81.59	4.09	4.32	4.21	74.87	79.89	77.38	5.39	5.52	5.46	5.51	5.69	5.60
NAA 30 ppm	83.45	89.37	86.41	4.12	4.42	4.27	79.33	84.95	82.14	5.50	5.62	5.56	5.70	5.82	5.76
Urea 2%	80.32	85.82	83.07	4.05	4.96	4.51	76.27	80.86	78.57	5.46	5.54	5.50	5.59	5.71	5.65
Urea 3%	84.26	90.27	87.27	4.65	4.72	4.69	79.62	85.55	82.59	5.53	5.69	5.61	5.70	5.84	5.77
Hand thinning 15 cm	100.54	10.3.74	102.14	5.06	5.41	5.24	95.48	98.33	96.91	5.64	5.89	5.77	5.98	6.11	6.05
Hand thinning 20 cm	122.30	121.65	121.98	6.03	6.02	6.01	116.27	115.63	115.95	5.87	5.99	5.93	6.34	6.51	6.43
L.S.D. 0.05	1.98	2.11	--	0.05	0.11	--	1.96	2.06	--	0.17	0.11	--	0.11	0.08	--

Table (5): Effect of the different thinning treatments on firmness, TSS, Acidity and TSS/acid ratio of "Desert Red" cv. peach trees during 2004 and 2005 seasons.

Treatments	Firmness (lb/inch^2)			TSS (%)			Acidity (%)			TSS/acid ratio		
	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean
Control	12.85	12.43	12.64	11.40	11.70	11.55	0.85	0.79	0.82	13.41	14.81	14.11
NAA 20 ppm	12.61	12.37	12.49	11.60	12.00	11.80	0.80	0.76	0.78	14.50	15.79	15.15
NAA 30 ppm	12.57	12.21	12.39	11.80	12.10	11.95	0.72	0.75	0.74	16.39	16.13	16.26
Urea 2%	12.87	12.51	12.69	11.50	11.80	11.65	0.87	0.80	0.84	13.22	14.75	13.99
Urea 3%	12.95	12.60	12.78	11.60	11.90	11.75	0.89	0.81	0.85	13.03	14.69	13.86
Hand thinning 15 cm	12.42	12.31	12.37	12.00	12.30	12.15	0.70	0.67	0.69	17.14	18.36	17.75
Hand thinning 20 cm	12.21	12.14	12.18	12.20	12.90	12.55	0.69	0.60	0.65	17.68	21.5	19.59
L.S.D. 0.05	0.65	0.12	--	0.19	0.18	--	0.05	0.04	--	1.00	1.46	--

Table (6): Effect of some different thinning treatments on some chemical characteristics of "Desert Red" peach cultivar trees during 2004 and 2005 seasons.

Treatments	Vitamin C ((mg/100 ml juice)			Total sugar (%)			Total phenol (%)			Total carotene (mg/100 gm)			Anthocynine (mg/100 gm)		
	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean	2004	2005	Mean
Control	14.18	14.85	14.52	6.87	7.10	6.99	1.59	1.64	1.62	12.50	12.64	12.57	12.71	13.21	12.96
NAA 20 ppm.	14.16	14.74	14.45	7.01	7.24	7.13	1.54	1.55	1.55	12.81	13.01	12.91	13.87	14.45	14.16
NAA 30 ppm.	14.09	14.70	14.40	7.21	7.28	7.25	1.52	1.58	1.55	12.94	13.12	13.03	13.92	14.56	14.24
Urea 2%	14.80	15.72	15.26	7.31	7.20	7.26	1.57	1.63	1.60	12.61	12.75	12.68	12.85	13.24	13.05
Urea 3%	15.21	15.94	15.58	7.38	7.21	7.30	1.55	1.62	1.59	12.68	12.76	12.72	12.91	13.25	13.08
Hand thinning 15 cm.	14.20	14.80	14.50	7.52	7.78	7.65	1.50	1.54	1.52	13.17	13.42	13.30	15.65	15.61	15.63
Hand thinning 20 cm.	14.19	14.79	14.49	7.74	7.96	7.85	1.47	1.48	1.48	13.44	13.68	13.56	16.14	15.87	16.01
L.S.D. 0.05	0.13	0.82	–	0.07	0.11	–	0.05	0.07	–	0.09	0.10	–	0.98	0.53	–

الملخص العربي

مقارنة بعض طرق الخف علي النمو الخضري ، المحصول ومكوناته في صنف الخوخ "الديزرت رد"

نجوي أبو المجد عبد المجيد

محطة بحوث البساتين – النوبارية – مركز البحوث الزراعية – الجيزة

أجريت هذه الدراسة خلال موسمين متتاليين ٢٠٠٤ ، ٢٠٠٥ بمزرعة خاصة بمنطقة النوبارية في محافظة البحيرة علي صنف الخوخ "الديزرت رد" وكانت المعاملات هي رش الأشجار عند الإزهار الكامل بمحلول النفثالين أستيك أسيد بتركيز ٢٠ ، ٣٠ جزء في المليون واليوريا بتركيز ٢ ، ٣% والخف اليدوي بمسافة ١٥ ، ٢٠ سم . وقد أفادت النتائج أن كل معاملات الخف أدت إلي زيادة في طول النموات والمساحة الورقية في كلا موسمي الدراسة. لم يتأثر محتوي الأوراق من الكلوروفيل الكلي والكربوهيدرات بالرش بالنفثالين أستيك أسيد والخف اليدوي، بينما أدي الرش باليوريا إلي زيادة معنوية في كل من الكلوروفيل والكربوهيدرات الكلية في الأوراق. أيضاً أدت معاملات الخف الكيماوي والخف اليدوي إلي نقص في النسبة المئوية للثمار المتبقية ، وقد أدت إلي خفض المحصول لكل شجرة سواء عدد الثمار لكل شجرة أو المحصول محسوباً بالكيلو جرام لكل شجرة. كما أدت معاملات الخف إلي زيادة في وزن الثمرة ووزن البذرة ووزن اللحم وكذلك أبعاد الثمرة. أظهرت النتائج أن معاملات النفثالين أستيك أسيد والخف اليدوي أدت إلي خفض في صلابة الثمار ، بينما معاملات اليوريا أعطت ثمار أكثر صلابة. عموماً كل المعاملات أدت إلي زيادة في المواد الصلبة الذائبة الكلية ونسبة المواد الصلبة الكلية إلي الحموضة ، بينما خفضت النسبة المئوية للحموضة. ومن ناحية أخري فقد وجد أن معاملات اليوريا لم تؤثر علي النسبة المئوية للحموضة ، وأشارت النتائج أيضاً إلي أن محتوي الثمار من فيتامين ج زاد مع معاملات اليوريا بالمقارنة ببقية المعاملات ، بينما أدت كل المعاملات في نفس الوقت إلي زيادة محتوى الثمار من السكريات الكلية، والكاروتين الكلي والأنثوسيانين الكلي؛ كما أدت معاملات الرش بالنفثالين أستيك أسيد والخف اليدوي في موسمي الدراسة إلي خفض النسبة المئوية للفينولات الكلية في الثمار بينما لم تؤثر معاملات اليوريا علي الفينولات الكلية معنويا وذلك بالمقارنة بمعاملة الكنترول.