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RESPONSE OF SOME VEGETATIVE GROWTH CHARACTERISTICS OF PEACH (*Prunus persica* L) cv. DIXIRED TRANSPLANTS TO FOLIAR SPRAY WITH UREA AND SOME GROWTH REGULATORS

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ABSTRACT

This study was conducted during growing season (2019), in the nursery of the Horticulture Department, College of Agricultural Engineering Science, University of Duhok, Kurdistan region, Iraq, in Summel district, situated at western of Duhok city (8 km from Duhok city center). The study consisted the effect of spray with different concentrations of Urea (0, 1 and 2% Urea), GA_3 (0, 250 and 500mg L^{-1}) and Benzyl Adenine (BA) (0 and 150mg L^{-1}) on some vegetative growth characteristics of peach (*Prunus persica* L) cv. Dixired transplants. The superior results indicated the following: the transplants spray with Urea concentrations significantly gave the best increase length of shoots, leaf area, increase number of shoots, height of transplants, also transplants spray with GA_3 concentrations significantly gave the best result of increase length of shoots, leaf area, decrease number of shoots, increase height of transplants, whereas transplants spray with BA concentrations significantly gave the best result only of increase number of shoots. Generally, interaction between Urea and GA_3 was significant effect on all growth parameters (increase length of shoots, leaf area, leaf dry matter, increase of stem diameter, increase number of shoots and height of transplants) and the best interaction was 1 and 2% Urea + 500mg GA_3 L^{-1}. Also the interaction between Urea and BA was significantly effected on most growth parameters (increase length of shoots, leaf area, leaf dry matter, increase number of shoots and height of transplants) and the best interaction was 2% Urea + 150mg BA L^{-1}. Whereas the interaction between GA_3 + BA was significantly effected on only two parameters (increase number of shoots and height of transplants). The triple interaction between Urea + GA_3 + BA was significantly effected on all growth parameters (increase length of shoots, leaf area, leaf dry matter, increase of stem diameter, increase number of shoots and height of transplants) and the best interaction was 2% Urea + 500mg GA_3 L^{-1} +150mg BA L^{-1}.

KEY WORLDS: Spray, Urea, GA3, BA, Peach transplants.

INTRODUCTION

The peach (*Prunus persica* L. Bastch) is reversed as delicious and healthy summer fruit in most temperate regions of the world and it is known as a species of prunus that bear an edible juicy fruit. It is a deciduous tree belonging to the sub family "Amygdaloideae" of the family "Rosasea" **(Grisez *et al.*, 2008 and Desmond and Bassi, 2008)**. China is the native home for peach and (nectarine), has a 3000- year cultivation history **(Hang *et al.*, 2008)** and it currently boasts over 50% of the world production and acreages **(FAO, 2010)**.

The Persians brought the peach from china and passed it to the Romans; it is still possible to find considerable genetic variations among these species in the mountainous area of central Asea from the Shan region in China to Iraq Kurdistan, including Turkmenistan, Afganistan, Iran and Kurdistan of Iraq. This type of fruit has been cultivated from ancient time, and currently has many excellent cultivars, but it is cultivation and production is delayed as compared with develop countries **(Martinez- Gomezet *et al.*, 2003 and Bani, 2012).** Nitrogen is often regarded as the most important mineral nutrient, limiting crop production in many agricultural crops worldwide. It has a major effect on crop yield and quality. It is a component of enzymes, vitamins, the chlorophyll molecule, and is involved in nucleic and amino acid synthesis and protein production. It is important for cell division and growth of young tissues (e.g., buds, flowers, leaves, twigs). Nitrogen also affects the absorption and

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distribution of practically all other nutrients in the plant, and is particularly important to the tree during flowering and fruit set **(Tagliavini *et al.*, 1997 and Stellacio *et al.*, 2013). Salim *et al.*,(2020)** showed that adding three level of liquid Nutrigreen fertilizer and foliar spray with two concentrations of GA_3 in growth of sour orange seedlings. The results attested that the treatment of 100mgL^{-1} of GA_3 + 6 ml L^{-1} of Nutrigreen significantly outperformed the treatment of comparators as the increase in the stem diameter and leaf chlorophyll content, and the highest increase in seedlings length was obtained for the treatment of Nutrigreen at a concentration of 6 ml L^{-1}.

Gibberellins (GAs) constitute a group of tetracyclic diterpenes best known for their influence on seed germination, leaf expansion, stem elongation, flower and trichome initiation, and flower and fruit development **(Yamaguchi, 2008)**. They play an important role in modulating diverse processes throughout plant development and are known to improve the photosynthetic efficiency of plants through their influence on photosynthetic enzymes, leaf-area index, light interception and enhanced use efficiency of nutrients. The integrated mechanisms induced by gibberellic acid (GA_3) enhance the source potential and redistribution of photosynthates increases sink strength**. (Khan, *et. al.*, 2007).**Plant growth and development are normally limited by photosynthetic resources, i.e. 'source-limited'. The source activity drives the sink metabolism and in turn is related to C and N metabolism. The role of GA has been shown in influencing the source–sink relationship by affecting various plant processes **(Marschner, 1986).** GA_3-mediated increase in photosynthesis and utilization of soil nitrogen (N) was the cause of increase in source–sink relation in mustard **(Khan, *et.al.*, 2005).** The action of GA promotes sucrose synthesis within the leaf through their positive effect on fructose-1,6-biphosphatase and sucrose phosphate synthase. In addition, GA stimulates phloem loading through its action on cell Turgor, apoplast pH and hormone concentration (**Zamski, and Schaffer, 1996). Kurubar *et al.*, (2017)** studied the response of fig cultivar 'Poona' to different concentrations and intervals of GA_3. Fig plants sprayed with GA_3 at 60mg L^{-1} with three sprays at intervals of 15 days starting from bud initiation resulted in significant increase in shoot length, number of functional leaves.

6-benzylaminopurine (BAP) is a first-generation synthetic cytokinin, which is used for acceleration of plant cell growth and division, lateral bud emergence, basal shoot formation, flowering, and fruit set (**Sun and Zhang, 2006 and Ohashi *et al.*, 2009).** Furthermore, MFDS (Korea) has established a tolerance for BAP residue in 0.2 mg/kg mandarin, 0.2 mg/kg pear, and 0.1 mg/kg apple (MFDS, 2013). In EU, the default MRL of 0.01 mg/kg for BAP residue is regulated (European Commission, 2013), which signifies the requirement of their residue monitoring in agricultural commodities for risk assessment (**Ugare *et al.*, 2013).**

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MATERIALS AND METHODS

The experiment was carried out at the nursery of Horticulture Department/ College of Agricultural Engineering Sciences / University of Duhok located at Summel region, during the period from 1th December 2018 to 1th November 2019. The effect of spray with Urea, GA_3 and Benzyl Adenine (BA) on some vegetative growth characteristics of peach (*Prunus persica* L) cv. Dixired transplants was studied. One year old Dixired transplants used in this study were taken from Malta nursery and budded on seedling peach rootstocks, the transplants were similar as it is possible in growth vigor and size and putted in pots contained river soil (14 kg). A factorial Randomized Complete Block Design (RCBD) was used included three factors with all possible interactions. The first factor was foliar spray with three concentrations of urea $CO(NH_2)_2$ (46% N), (0, 1, and 2%), duplicated of two equal sprays, first spray was carried out at 24 / 4 /2019 (145 days after transplanting), the second spray was applied after half month of the first spray (9/5/2019). The second factor was foliar application of Gibberellic Acid (GA_3) with three concentrations (0, 250, and 500 mg L^{-1}) duplicated of two equal sprays, first spray was in 26/4/2019 (147 days after transplanting), the second spray was applied after half month from the first spray (12/5/2019). The third factor was foliar spray of Benzyl Adenine (BA) with two concentrations (0, and 150 mg L^{-1}) duplicated of two equal sprays, first spray was in 28/4/2019 (149 days after transplanting), the second spray was applied after half month from the first spray (15 /5/2019). Tee actual concentrations of the foliar application treatments were prepared by dissolving the chemical material in distilled water very well. A surfactant agent (Tween-80) was added to all spray treatment solutions at 2 drops (0.025%) per holder (2 liters) to reduce surface tension of solution. The transplants were sprayed with different treatment solutions to run off point, late in evening hours. Consequently, the experiment was consisted of 18 treatment combinations (3 * 3 * 2) with four replications and two transplants for each experimental unit (144 transplants) **(Al-Rawi and khalafalla, 2000)**. The studied measurements included: Increase length of shoots, leaf area, leaf dry matter, increase of stem diameter, increase number of shoots and height of transplants.

RESULTS AND DISCUSSIONS

1: Increase length of shoots (cm)

Results in Table (1) shows that spraying peach transplants with Urea levels was effective to reaching increase length of shoots to significant level especially at level 2% Urea. Also the effect

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of spraying peach transplants with GA_3 concentrations was significant in increment increase length of shoots especially at concentration 500mg GA_3 L^{-1}. Whereas the spray with BA concentrations was not effective to reaching increase length of shoots to significant level.

Table (1): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on increase length of shoots (cm) of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine(BA) mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	35.55 bc	37.92 bc	36.73 b	34.68 b
	250	33.42 bc	34.51 bc	33.96 b	
	500	34.59 bc	32.13 bc	33.36 b	
1	**0**	36.88 bc	34.67 bc	35.77 b	36.85 b
	250	29.63 c	37.42 bc	33.52 b	
	500	42.80 abc	39.71 bc	41.25 b	
2	**0**	36.21 bc	39.46 bc	37.83 b	43.20 a
	250	43.08 abc	40.17 bc	41.63 b	
	500	45.09 ab	55.17 a	50.13 a	
Urea*BA	**0**	34.52 b	34.85 b	**Means of GA_3**	
	1	36.43 b	37.27 b		
	2	41.46 ab	44.93 a		
GA_3*BA	**0**	36.21 a	37.35 a	36.78 b	
	250	35.38 a	37.36 a	36.37 b	
	500	40.82 a	42.34 a	41.58 a	
Means of BA		37.47 a	39.02 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Regarding the interaction of Urea and GA_3, it was significantly affected the increase length of shoots, the highest mean (50.13 cm) was recorded from combination between 2% Urea + 500mg GA_3 L^{-1}. Also the interaction of Urea and BA was significant in increment increase length of shoots; the best interaction treatment was 2% Urea + 150mg BA L^{-1} which gave the highest value (44.93 cm). While the interaction between GA_3 and BA was not significant effect on increase length of shoots (Table 1).

Results of Urea, GA_3 and BA interaction, indicated that the interaction among 2% Urea + 500mg GA_3 L^{-1} + 150mg BA L^{-1} was the most significant effective treatment as it gave the highest value of increase length of shoots (55.17 cm), while the lowest value (29.63 cm) was obtained at the interaction of 1% Urea + 250mg GA_3 L^{-1} + 0mg BA L^{-1} (Table 1).

2: Leaf Area (cm^2 /Leaf)

The obtained results of Table (2), revealed that spraying peach transplants with 2% Urea resulted in significant increase in leaf area which reached to (27.18 cm^2) as compared to the 1% Urea and control. Foliar spraying of GA_3 at concentration 500 mg L^{-1} was significant surpassed in enhancing the leaf area which gives the highest value (25.85 cm^2) as compared with control. Non significant effect in the leaf area was obtained as result of transplants spraying with BA (150mg BA L^{-1}).

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Table (2): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on leaf area (cm^2) of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine (BA) mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	22.10 bcd	18.35 cd	20.22 c	21.12 b
	250	17.64 d	21.30 bcd	19.46 c	
	500	25.59 a-d	21.76 bcd	23.67 bc	
1	**0**	24.27 a-d	23.21 bcd	23.74 bc	22.95 b
	250	19.71 cd	24.72 a-d	22.21 bc	
	500	21.20 bcd	24.59 a-d	22.89 bc	
2	**0**	18.61 cd	26.52 a-d	22.56 bc	27.18 a
	250	30.06 ab	25.98 a-d	28.02 ab	
	500	28.28 abc	33.65 a	30.97 a	
Urea*BA	**0**	21.77 b	20.47 b	**Means of GA_3**	
	1	21.73 b	24.18 ab		
	2	25.65 ab	28.72 a		
GA_3*BA	**0**	21.66 a	22.70 a	22.18 b	
	250	22.47 a	23.99 a	23.23 ab	
	500	25.02 a	26.67 a	25.85 a	
Means of BA		23.05 a	24.45 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

The interaction between Urea and GA_3 displayed in the Table (2), there were significant impact on leaf area. Furthermore, the highest leaf area (30.97 cm^2) was obtained from interaction of 2% Urea + 500mg GA_3 L^{-1}. Concerning the interaction between Urea and BA, there were significant effects on leaf area, the maximum leaf area (28.72 cm^2) was gotten for the interaction between 2% Urea + 150mg BA L^{-1}. Reversely, there were no significant effects of interaction between GA_3 and BA on leaf area of peach transplants.

Results of Urea, GA_3 and BA interaction in the Table (2) indicated that there was a significant effect on the leaf area, and displayed that the interaction among 2% Urea + 500mg GA_3 L^{-1} + 150mg BA L^{-1} was the paramount treatment interaction as it gave the highest leaf area (33.65 cm^2), where the lowest leaf area (17.64 cm^2) was gotten from the interaction of 0% Urea + 250mg GA_3 L^{-1} + 0mg BA L^{-1}.

3: Leaf Dry Matter percentage (%)

Table (3) shows that spraying peach transplants with each of urea, GA_3 and BA alone, did not have a significant effect on leaf dry weight percentage. The interaction between urea and GA_3 declared that there was significant effect on leaf dry weight percentage. Moreover, the highest leaf dry weight percentage (40.25 %) was obtained at 2% Urea + 250mg GA_3 L^{-1} interaction (Table 3).

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Table (3): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on leaf dry matter percentage (%) of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine (BA) mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	35.73ab	36.24ab	35.99ab	36.11a
	250	36.22ab	34.99b	35.60b	
	500	37.37ab	36.12ab	36.75ab	
1	**0**	41.84a	37.92ab	39.88ab	38.76a
	250	38.86ab	37.88ab	38.37ab	
	500	38.37ab	37.67ab	38.02ab	
2	**0**	34.17b	38.83ab	36.50ab	38.36a
	250	41.98a	38.53ab	40.25a	
	500	37.84ab	38.81ab	38.33ab	
Urea*BA	**0**	36.44ab	35.78b	**Means of GA_3**	
	1	39.69a	37.82ab		
	2	37.99ab	38.73ab		
GA_3*BA	**0**	37.24a	37.66a	37.46a	
	250	39.02a	37.13a	38.08a	
	500	37.86a	37.53a	37.69a	
Means of BA		38.04a	37.44 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Results in Table (3) exposed that there were a significant interaction between Urea and BA on leaf dry weight percentage, and the most potent interaction was 1% Urea + 0mg BA L^{-1} which gave the highest shoot length (39.69 %). In contrast, the interaction between GA_3 and BA, there was no significant influence on leaf dry weight percentage.

Results of triple interaction among Urea, GA_3 and BA indicated that the most significant effective interaction was 2% Urea + 250mg GA_3 L^{-1} + 0mg BA L^{-1} as it gave the highest leaf dry weight percentage (41.98 %) (Table 3).

4: Increase of Stem Diameter (cm).

It is obvious from Table (4) that there was no significant effect with spray of three studied factors (Urea, GA_3 and BA) each alone on increase of stem diameter.

The combination between Urea and GA_3 revealed that there was significant effect on increase of stem diameter, where the highest increase in stem diameter (2.396 cm) was obtained at 1% Urea + 500mg GA_3 L^{-1} combination (Table 4).

Results from Table (4), showed that at both combinations Urea * BA and GA_3 * BA there were no significant effect on increase of stem diameter.

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Table (4): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on increase of stem diameter (cm) of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine (BA) mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	1.988 abc	2.038 abc	2.013 abc	1.755 a
	250	1.548 abc	1.738 abc	1.643 abc	
	500	1.933 abc	1.288 bc	1.610 abc	
1	**0**	2.453 ab	1.765 abc	2.109 abc	2.025 a
	250	1.381 bc	1.763 abc	1.572 abc	
	500	2.085 abc	2.708 a	2.396 a	
2	**0**	1.150 c	1.525 abc	1.338 c	1.696 a
	250	2.360 abc	2.203 abc	2.281 ab	
	500	1.505 abc	1.433 bc	1.469 bc	
Urea*BA	**0**	1.823 a	1.688 a	**Means of GA_3**	
	1	1.973 a	2.078 a		
	2	1.672 a	1.720 a		
GA_3*BA	**0**	1.863 a	1.776 a	1.820 a	
	250	1.763 a	1.901 a	1.831 a	
	500	1.841 a	1.809 a	1.825 a	
Means of BA		1.822 a	1.829 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Concerning the triple combination among Urea, GA_3 and BA mentioned that there was significant influence on increase of stem diameter. Where the best combination in increase of stem diameter (2.708 cm) was 1% Urea + 500mg GA_3 L^{-1} + 150mg BA L^{-1}. Whereas the lowest increase in stem diameter (1.150 cm) was observed in combination between 2% Urea + 0mg GA_3 L^{-1} + 0mg BA L^{-1} (Table 4).

5: Increase Number of Shoots

Table (5) shows that spraying peach transplants with Urea and BA levels have a significant effect on increase number of shoots especially at level 1% Urea and 150mg BA L^{-1} respectively. While the effects of GA_3 have a negative significant effect in decreasing number of shoots especially at concentration 500mg GA_3 L^{-1}.

Table (5): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on increase number of shoots of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	8.25 ab	7.63 abc	7.94 ab	7.25 b
	250	7.63 abc	9.25 a	8.44 a	
	500	4.13 bc	6.63 abc	5.38 b	
1	**0**	10.63 a	7.38 abc	9.00 a	9.02 a
	250	6.88 abc	10.64 a	8.75 a	
	500	9.75 a	8.88 a	9.31 a	

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2	**0**	8.50 a	9.63 a	9.06 a	7.80 ab
	250	7.38 abc	9.75 a	8.56 a	
	500	3.63 c	7.90 ab	5.76 b	
Urea*BA	**0**	6.67 b	7.83 ab	**Means of GA_3**	
	1	9.08 a	8.96 a		
	2	6.50 b	9.09 a		
GA_3*BA	**0**	9.13 ab	8.21 ab	8.67 a	
	250	7.29 bc	9.88 a	8.58 a	
	500	5.83 c	7.80 abc	6.82 b	
Means of BA		7.42 b	8.63 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

It is clear from Table (5), that the interaction between Urea and GA_3 have a significant effect on increase number of shoots particularly at interaction between 1% Urea and 500mg GA_3 L^{-1}, which gave the highest value (9.31) of increase number of shoots. Also the interaction of 2% Urea + 150mg BA L^{-1} appeared to be the most potent interaction treatment, as it gave the highest increase number of shoots, which was (9.09)(Table 5). Results in the same table, reveals that there was significant effect of interaction between GA_3 and BA on increase number of shoots particularly at interaction between 250mg GA_3 L^{-1} and 150mg BA L^{-1} which gave the highest increase number of shoots (9.88).

The highest significant increase number of shoots (10.64) was obtained from the combination of 1% Urea + 250mg GA_3 L^{-1} + 150mg BA L^{-1}. While the lowest increase number of shoots (3.63) was showed at the combination among 2% Urea + 500mg GA_3 L^{-1} + 0mg BA L^{-1} (Table 5).

6: Height of transplants (cm)

Table (6) reveals that spraying peach transplants with Urea levels significantly increases height of transplants essentiality at two levels (1 and 2% Urea) as compared with control. Also from the same Table, spraying with GA_3 concentrations significantly increases the height of transplants essentiality at two concentrations (250 and 500mg GA_3 L^{-1}) as compared with control. But spraying with BA concentrations (0 and 150mg BA L^{-1}) did not significantly increase the height of transplants.

Table (6): Effect of Urea, GA_3, Benzyl Adenine (BA) and their interactions on height of transplants (cm) of Dixired peach transplants.

Urea %	GA_3 mg L^{-1}	Benzyl Adenine (BA) mg L^{-1}		Urea*GA_3	Means of Urea
		0	**150**		
0	**0**	123.63 b	124.08 b	123.85 c	135.40 b
	250	145.00 ab	147.63 ab	146.31 ab	
	500	147.13 ab	125.00 b	136.06 bc	
1	**0**	146.75 ab	151.75 ab	149.25 ab	151.89 a
	250	147.88 ab	142.88 ab	145.38 ab	
	500	164.38 a	157.75 a	161.06 a	
2	**0**	135.25 ab	147.63 ab	141.44 abc	151.42 a
	250	160.88 a	158.13 a	159.50 a	
	500	155.38 a	151.25 ab	153.31 ab	
Urea*BA	**0**	138.58 ab	132.23 b	**Means of GA_3**	

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	1	153.00 a	150.79 a		
	2	150.50 a	152.33 a		
GA_3*BA	**0**	135.21 b	141.15 ab	138.18 b	
	250	151.25 ab	149.54 ab	150.40 a	
	500	155.63 a	144.67 ab	150.15 a	
Means of BA		147.36 a	145.12 a		

Means of each factor and their interactions followed by the same or shared letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

The combination between Urea and GA_3 illustrate that there were significant effect on height of transplants, where the highest height of transplants (161.06 cm) was obtained at the combination of 1% Urea with 500mg GA_3 L^{-1} (Table 6). Also the combination between Urea and BA was significant in increase height of transplants essentiality at combination between 1% Urea + 0mg BA L^{-1} which the maximum height of transplants (153 cm). By the same direction, there was significant effect of combination between GA_3 and BA on height of transplants essentiality at treatment of 500mg GA_3 L^{-1} + 0mg BA L^{-1} which gave the maximum height of transplants (155.63 cm)(Table 6).

The best value of height of transplants from the triple interaction among Urea + GA_3 + BA concentrations was showed from the interaction among 1% Urea + 500mg GA_3 L^{-1} + 0mg BA L^{-1} as (164.38 cm) in comparison with lowest value (123.63 cm) from triple interaction among 0% Urea + 0mg GA_3 L^{-1} + 0mg BA L^{-1} (Table 6).

It was obvious from the above mentioned results in Tables (1-6) that the vegetative growth characteristics (Increase length of shoots, leaf area, increase number of shoots and height of transplants) were affected significantly by transplants spray with Urea concentrations, evidence supporting this finding has been reported by **Ahmed *et al.*, (1995); Albrigo, (2002); Abdul-Qader, (2012); Khan *et al.*, (2016), and Singh, *et. al.*,(2017).** The reasons of the high increase length of shoots, leaf area, increase number of shoots and height of transplants might be due to the role of nitrogen as an important component of many structural, genetic and metabolic compounds such as Purines, pyrimidine's that are found in the nucleic acids RNA and DNA and are essential for protein synthesis, porphyrines structure that are found in chlorophyll pigments and cytochromes which are essential in photosynthesis and respiration, and coenzymes which are essential for the function of many enzymes. Accordingly, nitrogen plays an important role in the synthesis of the plant constituents through the action of different enzymes and a limiting factors for plants growth and poses with elemental phosphorus and potassium more nutrients beneficial to the plant, a percentage of higher plant is (1-4 %) of the dry weight **(Ting, 1981; Jones *et al*., 1991)**.

Concerning the effect of transplants spray with different concentrations of GA_3 on some growth characteristics of Dixired peach transplants (Increase length of shoots, leaf area and height of transplants), it was increased significantly by GA_3 concentrations and decreased significantly of increase number of shoots (Tables 1, 2, 5 and 6), these results are in accordance with those obtained by **Abd-Ella and El-Sisi, 2011; Al-Emam and Al-Gebory 2008; Al-Zebari 2008; Mohamed 2015 and Ennab (2017).** The reason of growth improvement of GA_3 treated transplants to the influence of GA_3 on cell wall and cell cytoplasm. They founded that GA_3 highly increased cell size and cell number which finally reflected on tissue size, and they referred that osmosis of cell solutes to the impact of GA_3 on mRNA transcriptions was responsible for enzyme synthesis, especially those involved in chlorophyll synthesis.**; Amar, 2003; Mukherji and Ghosh , 2005 and Hartman *et al.*, 2014).**

About the effect of benzyl adenine (BA) on some vegetative characteristics, it was noticed from the table (5), the obtained results that BA concentration increased significantly only increased number of shoots per transplant, similar results were obtained by **Jaumien *et al.*, 2002, Caglar and IIgin 2009; Clements *et al.*, 2010; Magdalena 2010; Zamanipour, *et al.*, 2012 and Saracoglu and Cebe (2018).** The reason of this result may be due to the role of Benzyl adenines as a first generation synthetic of cytokinines that impact plant growth and development, it done as preventer of respiratory in plants, impacting cell division and shoot formation, retarding senescence of tissues, also they are official for transforming of the Auxin inside plant tissues,

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and affect leaf growth **(Siddiqui *et al.*, 2011).** A combination of notching and BA application, or BA application alone (Single or possibly multiple applications), may be the best options for improving branching in poorly branched trees **(Clements *et al.*, 2010).** Cytokinins such as BA, alone or in combination with gibberellins, have been used to overcome apical dominance and to stimulate the development of lateral shoots, with positive results in many countries **(Hrotko *et al.*, 1996; Jaumien *et al.*, 2002).** It was reported by **Caglar and IIgin (2009)** that the exogenous application of BA might have influenced the internal BA contents of the buds, and there by caused the different branching pattern.

CONCLUSIONS

According to the results of this study, the most important as follows: (1) It can be concluded that the spray with Urea 2% was more effective in enhancing leaf area and increase length of shoots. Transplants spray with urea at 1 and 2% concentrations was more efficient in improving height of transplants. Transplants spray with Urea at concentration 1% was more effective in stimulating increase number of shoots. (2) Spray with GA_3 at 500mg L^{-1} was more effective in improving increase length of shoots and increase number of shoots. Spray with GA_3 at 500mg L^{-1} was the best in enhancing leaf area. Spray with GA_3 ant concentrations 250 and 500mg L^{-1} was more efficient in enhancing height of transplants.(3) Spray with BA at concentration 150mg L^{-1} was effective in stimulating only number of shoots. Generally, transplants spray with Urea and GA_3 was surpassed on foliar spray with BA in most studied parameters.

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