
ENHANCED PHYSICAL AND CHEMICAL CHARACTERISTICS OF LOCAL APPLE FRUIT CV. KUFIE TREATED WITH ALGAE EXTRACT ,DAMINOZID AND ZNSO4

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ABSTRACT

An experiment was conducted on private orchard at Abbasiya / Najaf governorate for season 2017 to investigate the effects of spraying trees local apple fruit cv. Kufie with Algae extract 2% and 3%, Daminozid at conc. Of 250 mg/L and Zinc sulphate at conc. Of 3000 mg/L after 40 days from full bloom stage in single way or combination. Fruits were picked after 85 days from full bloom. The experiment included 12 treatments with three replicates . It is adopted according to Randomized Complete Block Design (RCBD) , and the results were statistically analyzed according to Duncan test at the probability level of 5%. The result indicated that the diameter of fruit , length of fruit , weight of fruit, volume of fruit , moisture of pulp , moisture of peels , fruit firmness percentage of weight of juice , percentage of titrable acidity , percentage of total soluble solids , percentage of T.S.S / TA , vitamin C , and percentage of calcium pectate, increasing significantly with increase concentration of Algae extract that interaction with Daminozid and Zinc Sulphate and reducing percentage of cracking compared with control treatment. The treatment of (Algae extract 3% + Daminozid 250 mg/L + ZnSO4 3000 mg/L) gave the highest rate of parameters studied.

Keywords: Algae extract, Daminozid , Zinc sulphate ,local apple cv. Kufie.

INTRODUCTION

Basak (2008) mentioned that , spraying apple trees in the end of full bloom period with extract of alga Eckonia (Kelpak) at conc. of (0.5 , 1 and 2 %) caused a significant increase in the leaf area , content of leaves from total chlorophyll , hormones , IAA , GA₃ , and quality of fruits compared to control treatment . Dell (2013) showed that , sea weed and extract of alga's containing high percentage of Salicylic acid , cytokinin , Fume acid ,GA³ and auxins that increasing root and shoot of plant , process of photosynthesis and activate plant growth which led to enhance hormones synthesis and delay of senescence of leaves .Bondok et al(2013) found that spraying grape trees with extract of alga's (Acadian , Goemar and BM86) at conc. of (0.5 , 1 and 2 %) caused increase in the vegetative growth and fruits quality with increase of concentration of extract of alga's. Bund and Norrie (2011) observed that cherry trees when applied at (0.5,1 and 2) Kg/ H seaweed increased length ,diameter of fruit ,total yield of trees , total soluble solids , total sugar , vitamin C and anthocyanine pigment in fruit . AL- Hameedawi and AL- Malikshah (2017) found that, spraying fig trees cv. Asowd Diala with seaweed

Ascophyllum nodosum at concentrations of 4% caused a significant increase percentage of diameter of fruit , length of fruit , weight of fruit , percentage humidity of fruit , percentage dry matter of fruit, number of days to ripening , percentage of total soluble solid , fruit firmness and total yield of trees compared with control treatment . EL-Khawaga (2007) observed that pomegranate trees when applied at (50 ,100 and 150) mg/liter paclobutrazol and Zinc sulphate (2000 , 3000 and 4000) mg/L in late May and mid-July increased total soluble solids , total sugar , vitamin C and reducing percentage of crackings compared with control treatment . Abdalla (2009) found that spraying grape tress cv. Des- Anizs with paclobutrazol at conc. of 1000 mg/L effectiveness in increasing fruit firmness and total carbohydrates percentage , total soluble solids , total sugar , vitamin C in fruits at ripening . AL – Hamdawi *et. al.* (2006) found that spraying fig tress cv. "Waziri" after one week from rest period of fruits with Zinc sulphate at conc. of 0.3% led to reduction in fruit cracking and increased total soluble solids , total sugar , vitamin C and firmness at ripening . AL – Hamdawi *et. al.* (2004) noticed that , the spraying of Pactlobutrazol (PBZ)at concentration of (25,50 and 75 ppm) on Fig trees c.v. Wazeri, when fruits of second crop at the depressed period on 25/5/for seasons 2001 and 2002 has reduced the proportion of fruit cracking to 12% compared to 16% in the fruits of control treatment . AL – Hamdawi and AL –Numani (2012) mentioned that spraying trees of fig cv. Aswod Diala with paclobutrazol and Zinc sulfate at conc. Of (100,150 and 200) mg/L and (2000 , 3000 and 4000) mg/L each ather 6 weeks before fruit harvest increased the Total soluble solids, , total sugar , vitamin C , percentage of carbohydrate and firmness of fruts and reduced the type of cracking and total cracking on ripe Fruits during the months of 7 and 8 . The main objective of this investigation is to study of the effect of using Algae extract , Daminozid and Zinc Sulphate applied as foliar sprays on physical and chemical characteristics of local apple fruits cv . Kufie during ripening .

MATERIALS AND METHODS

This study was conducted in a privat farm at Abbasiya / Najaf governorate for the 2017 season on local apple fruit cv. Kufie .The trees spraying with Algae extract 2% and 3%, Daminozid at conc. Of 250 mg/L and Zinc Sulphate at conc. Of 3000 mg/L after 40 days from full bloom stage in single way or combination . Fruits were picked after 85 days from full bloom . 36 trees at same size and growth trees were selected with 12 years of age , that planted on (5 x 5 m.) , they watered every five days. The experiment included 12 treatments with three replicates. It is a dopted according to Randomized Complete Block Design (RCBD) , and the results were statistically analyzed according to Duncan test at the probability level of 5% (Al-Rawi and Khalf Allah , 2000) . Spraying was done early morning until wetness was full addendum . Tween 20 was added at conc. of 1cm³/L as spreader material . The experiment involved the following 12 treatments :

1-Control .

2-Algae extract at conc. of 2% . it was natural Algae extract (oligo-x) obtained from Agas (Arabian group for agricultural service) company having the following composition:

oligosaccharide (3%), algic acid (5%), phytin (0.003%), menthol (0.001%), natural growth regulators (cytokinin, 0.001 ; indol acetic acid, 0.0002% and pepsin, 0.02%) and minerals (potassium oxide, 12% ; phosphorus oxide, 0.5% ; N, 1% ; Zn, 0.3% ; Fe, 0.2% and Mn, 0.1%).

3-Algae extract at conc. of 3% .

4-Daminozid(Da) (these were discs of inhibitor growth A-(5-hydroxy car acryl) – trim ethyl chloride piper din from the production of Probelta Company, Spain) as foliar sprays at concentration of (250) mg/L .

5-Zinc Sulphate ($ZnSO_4$) as foliar sprays at concentration of (3000) mg/L .

6- Da + $ZnSO_4$.

7- Algae extract 2% + Da .

8- Algae extract 3% + Da .

9- Algae extract 2% + $ZnSO_4$.

10- Algae extract 3% + $ZnSO_4$.

11- Algae extract 2% + Da + $Zn SO_4$.

12- Algae extract 3% + Da + $Zn SO_4$.

Ten normal fruits were taken at random on mature stage from each tree for physical and chemical determination , diameter of fruit cm ,length of fruit cm , length of fruit/ diameter of fruit, volume of fruit cm^3 , specific gravity of fruit ,percentage of moisture of pulp , moisture of peels , percentage dry matter of fruit, percentage of total cracking , according to (Ibrahim , 2010).Calcium pictate was determined according to (Rouhani and Bassiri , 1976) .Firmness was measured on two sides of each fruit with an Effegi penetrometer (Model NI , McCormick Fruit Tech , Yakima , WA) Fitted with an 11.1mm tip . The total soluble solids were determined by hand refract meter. percentage of weight of juice , total percentage of acidity , Vitamin C mg /100 ml Juice according to (A.O.A.C, 1985) .The juice was extracted and the total soluble solids were determined by hand refract meter. Firmness was measured on two sides of each fruit with an Effegi penetrometer (Model NI , McCormick Fruit Tech ,Yakima ,WA) Fitted with an 11.1mm tip . The percentage of total cracking according to (Zubair,2014) .

RESULTS AND DISCUSSION

1- Effect of spraying with Algae extract , Daminozid and Zinc Sulphate on physical characterize of fruits local apple fruit cv. Kufie .

Concerning the results in Table (1 and 2) , diameter of fruit , length of fruit , weight of fruit, volume of fruit , moisture of pulp , moisture of peels and fruit firmness and were significantly affected by all treatments . It is cleared that spraying Algae extract , Daminozid and Zinc Sulphate in single way or in combination to the fig trees increased physical characters of fruits compared with untreated trees. The highest parameters they were (5.82 cm , 4.86 cm, 37.45 gm,

34.01cm³ ,76.20%, 74.80 % and 4.30 kg /cm²) . On the other hand, untreated trees gave the lowest value they were (5.30 cm , 4.50 cm, 33.18 gm, 29.01cm³ ,76.48%, 23.52% 0.302kg /cm² and 16.45 kg/tree) respectively .In addition, the single and combination treatments led to a significant decreased in the percentage of total cracking of fruit and the lowest value 3.03% in the treatment (Algae extract 3% + Daminozid + Zn SO₄) comparison with the highest rates 10.77% in control treatment ,while shape of fruit and specific gravity was not significant with the single way or in combination treatment spraying to apple trees compared with untreated trees. Increased physical characters of fruits at harvest may be due to enhanced cell enlargement by growth regulators during developmental stages. The major plant growth regulators present in spraying material are auxins, cytokinins, indoles and hormones are a major factor applied to trees in promoting the growth of fruiting spurs and reduce premature dropping of fruit and improve the physical characters of the fruit and yield (Zubair , 2010) . Abed El- Hamied (2014) confirmed that the Algae extract led to improve the vegetative growth of trees and there by increases total chlorophyll and transformation of manufactured absorbed materials , causing firm fruit and makes it more resistant to cracking . Paclobutrazol may be decrease fruit cell division during the first stage of fruit growth and improve fruit cell enlargement during the following stage EL-Khawaga (2007) . The increase in firmness in fruits due to spraying trees with Daminozid and Zn because these treatments plays an important role in strengthening the cell walls through its role in enhancing pectin coherence which increases the thickness of cell walls , which makes it more strength and stiffness to resist pectin analysis enzymes (Jundi , 2003) . Wielana and Wample (2007) noticed that increasing fruit firmness which results through spraying the Daminozide due to the fact that this compound reduce vegetative growth and thus encourages the accumulation of carbohydrate materials in fruits leading to increased content of pectic materials , their by increasing its firmness.

2- Effect of spraying with Algae extract , Daminozid and Zinc Sulphate on chemical physical characterize of fruits local apple fruit cv. Kufie .

Data in Table (2) show the effect of spraying Algae extract , Daminozid and Zinc Sulphate in single way or in combination on percentage of weight of juice , percentage of titrable acidity , percentage of total soluble solids , percentage of T.S.S / TA , vitamin C , and percentage of calcium pectate . Results clear that the all estimated characters were significantly increased and the highest averages(53.85% ,1.39% , 12.82 % , ,9.90 mg / 100 ml Juice and 4.40%) , respectively in the treatment (Algae extract 3% + Da + Zn SO₄) compared to the lowest rates (50.72% ,1.13% , 11.66 % , ,8.61 mg / 100 ml Juice and 3.29) , respectively in control treatment. while , the percentage of T.S.S / TA was not significant with the single way or in combination treatment compared with untreated trees .The increase in Chemical characterize which results through spraying Algae extract , Daminozid and Zinc sulfate due to the fact that this compound increase vegetative growth and thus encourages the accumulation of carbohydrate materials in fruits leading to increased content of these materials (Devlin and 2001) .These result are in line

with (Malguti et.al, 2002, Spinelli *et al.*, 2009) on apple fruits they mentioned that applying of seaweed extract to the trees improved physical and chemical of fruits .

CONCLUSION

It could be concluded from this experiment that , spraying trees with Algae extract , Daminozid and Zinc Sulphate companied as a single or combination increase the diameter of fruit , length of fruit , weight of fruit, volume of fruit , moisture Of pulp , moisture Of peels , fruit firmness percentage of weight of juice , percentage of titrable acidity , percentage of total soluble solids , vitamin C and percentage of calcium pictate, and reducing percentage of total cracklings compared with control treatment .

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Table 1 . Effect of spraying of with Algae extract , Daminozid and Zinc Sulphate on physical characterize of apple fruit cv. Kufie for season 2017

Treatments	Diameter of fruit cm	Length of fruit cm	Shape of fruit	Weight of fruit gm	Volume of fruit cm ³	Specific gravity	% moisture of pulp	% moisture of peel
Control	4.80 h	3.95cd	0.82a	30.18 i	28.69 h	1.15 a	76.20 ijk	74.80 cd
Algae extract (Ae) at conc. of 2%	5.14 gh	4.56 bcd	0.80a	31.46 gh	29.12 fg	1.11a	76.89 jk	75.11b cd
Algae extract (Ae) at conc. of 3%	5.30 efgh	4.49 cd	0.81a	33.26 f	30.75 cd	1.11 a	77.11 hijk	75.25 bc
Daminozid(Da) at conc. of 250 mg / L	5.34 defg	4.62 bcd	0.83a	34.51 f	31.11 bcd	1.12 a	77.16 ghij	75.53 bc
ZnSO ₄) at conc. of 3000 mg / L	5.34 defg	4.68abc	0.88a	33.12 f	30.75 cd	1.10 a	77.26 fgh	75.74 bc
Da + ZnSO ₄	5.37 cdefg	4.71bc	0.84a	33.84f	30.31 de	1.14 a	77.22 fghi	75.78 bc
Algae extract 2% + Da	5.59 abcd	4.71abc	0.80a	35.60 cde	31.52 abc	1.16 a	77.59 bcd	75.91 bc
Algae extract 3% + Da	5.53abcde	4.75abc	0.82a	35.97	31.43 abc	1.17 a	77.45 cde	76.09 ab

				cde				
Algae extract 2% + ZnSO ₄	5.64 abc	4.77 ab	0.81a	35.37 bcd	31.60 abc	1.15 a	77.53 bcd	76.17 ab
Algae extract 3% + ZnSO ₄	5.70ab	4.80 ab	0.80a	36.97 ab	32.12 ab	1.18 a	77.61 abc	76.39 Ab
Algae extract 2% + Da + Zn SO ₄	5.67ab	4.78 ab	0.80a	36.49 bc	33.18 ab	1.12 a	77.72 ab	76.48 ab
Algae extract 3% + Da + Zn SO ₄	5.82 a	4.86 a	0.80a	37.45a	34.01 a	1.10 a	77.88 a	76.69 a

Means followed by the same letters are not significantly different.

Table 2 . Effect of spraying of Effect of spraying of with Algae extract , Daminozid and Zinc Sulphate on physical and chemical characterize of apple fruit cv. Kufie for season 2017

Treatments	Firmness Kg/cm ²	% weight of juice	% Total crackin g	titra ble acidi ty (TA)	% Total solubl e solids T.S.S	T.S.S / TA	Vitamin C mg / 100 ml Juice	% calci um pictat e
Control	3.11 h	50.72e	10.77a	1.13 ef	11.66 ab	10.31 a	8.61efg	3.29e fg
Algae extract (Ae) at conc. of 2%	3.38 efg	51.32d	9.81 b	1.15 de	12.06 ab	10.48 a	8.86def	3.46d ef
Algae extract (Ae) at conc. of 3%	3.50 ef	51.84b c	8.13 bc	1.16 de	12.15 b a	10.47 a	8.79ef	3.66c d

Daminozid(Da) at conc. of 250 mg / L	3.58 de	51.17d	7.35cd	1.15 de	12.11 ab	10.53 a	8.91def	3.59c de
ZnSO ₄) at conc. of 3000 mg / L	3.79 cd	51.31d	7.75bcd	1.19 cd	12.19 ab	10.24 a	8.75ef	3.70c d
Da + ZnSO ₄	3.82 de	51.90b c	4.12fgh	1.20 bc	12.22 ab	10.18 a	9.13de	3.77b cd
Algae extract 2% + Da	3.80 cd	52.77b	4.36fg	1.20 bc	12.28 ab	10.23 a	9.22cde	3.48c de
Algae extract 3% + Da	3.93 bc	52.84b c	4.01fgh	1.21 bc	12.27 ab	10.25 a	9.37cd	3.65c d
Algae extract 2% + ZnSO ₄	3.99 bc	52.78b	5.86f	1.18 c	12.39 ab	10.50 a	9.15de	3.80b c
Algae extract 3% + ZnSO ₄	4.05 ab	53.04b c	5.55fg	1.23 ab	12.55 ab	10.20 a	9.48bc	3.97b c
Algae extract 2% + Da + Zn SO ₄	4.09 ab	53.44b c	3.60gh	1.30 ab	12.58 ab	9.67a	9.62 b	4.18a b
Algae extract 3% + Da + Zn SO ₄	4.30 a	53.85a	3.03 h	1.39 a	12.82 a	9.22a	9.90a	4.40a

Means followed by the same letters are not significantly different.