



ORIGINAL ARTICLE

RESPONSE OF POMEGRANATE TREES (*PUNICAGRANATUM L.*) TO SPRAYING WITH GROWTH REGULATORS (FLORATONE) AND NUTRIENT SOLUTION (ULTRA KELP40)

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Abstract: This experiment was conducted in Al-Hindia, Babylon orchards in 2018-2019 to study the effect of spraying growth regulator (Floratone) in four levels (0,3,6,9) mg.L⁻¹. Furthermore, ULTRA KELP40 nutrition solution has sprayed in three levels (0,15,30) ml.L⁻¹ to study the chemical, quantity, and quality traits of pomegranate trees. The experiment took place according to the Randomized complete block design (R.C.B.D) with three replicates, and the averages were compared according to the least significant difference test at the level of probability 0.05. The results showed that spraying (Floratone) with 9 mg.L⁻¹ significantly excelled in traits of (chlorophyll amount, fruit weight average, total yield rate and (K.P.N) percentage) and gave the highest average amounted to 41.73 mg/cm², 102,47 gm, 13.80 kg/tree, 1.77, 0.56, 1.49%, respectively. While the treatment at concentration 6 mg.L⁻¹ excelled and gave the highest average of traits T.S.S (total soluble solids) and Fe percentage reached (185.89 and 14.58%), while the spraying with (ULTRA KELP40) at an concentration 30 ml.L⁻¹ significantly excelled in traits (chlorophyll content, fruit weight average, total yield, T.S.S., N, P, K and Fe) and gave 40.82 mg/cm², 100.49 gm, 13.79 kg / tree, 14.46, 1.76, 0.55, 1.48, 183.00, respectively.

Key words: Pomegranate tree, Floratone, Ultra KELP 40.

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1. Introduction

Pomegranate plant *punica granatum L.* follows the pomegranate family (*punicaceae*) numbers of pomegranate trees in Iraq, it is about 386013 trees with average production reached 219822 tons at rate of 34.07 kg/tree [Agricultural Statistics Directorate (2019)]. Salimi cultivar pomegranate is widely distributed in the central region of Iraq. Pomegranate fruit is characterized by nutritional value from protein content, fat and vitamin [Opara *et al.* (2009)]. Organic fertilizer is a very important factor for increasing the activity of trees and thus increasing the productivity of trees, especially if adding nutrients is a spray on the leaves. [Abo thahi and Yasin (1988), Abdulrazzaq and

Mohammed (2019)]. In fact, industrial growth regulators formed an important part from chemicals that if it is used in probable time and with appropriate concentrations on specific plant cultivar with right method [Issa *et al.* (2019)]. Zainal (2018) found that pomegranate trees (Salimi cultivar) were sprayed with humic acid in concentration of 1 mg/l has been positively effected on chlorophyll index, fruit volume average and total solids ratio. Al-Hyani and Qahar (2018) got a significant increase in relative chlorophyll content, quality and quantity of yield. This study aims to determine the best levels of organic fertilizer and growth regulators to improve a chemical tree growth and yield traits.

2. Materials and Methods

This experiment was conducted in Al-Hindia–Babylon orchards in 2018-2019 to study the effect of spraying growth regulator (Floratone) in four levels (0,3,6,9) mg.L⁻¹ and spraying (ULTRA KELP40 nutrition) solution in three levels (0,15,30) ml.L⁻¹ on chemical, quantity, and quality traits for pomegranate trees. The ULTRA KELP40 fertilizer was natural extract which contains nitrogen, phosphorus and potassium elements, also contains minor elements like copper, iron, magnesium, molybdenum and zinc. Spraying was done early in the morning using a Hand sprinkler with a capacity of 10 liters with adding diffuser (Tween-20) three times in 30 days between spraying and another.

2.1 Studies traits

1. Chlorophyll content estimate.

2. The chlorophyll in leaves was measured using Chlorophyll meter – SPAD 502 type which equipped from Minolta company from Japan was used [Minnotti *et al.* (1994)], and it was measured by SPAD unit.

3. Fruit weight average (g): This was done by calculating the weight of the fruits for each treatment and extracting the average for each experimental unit

4. Total yield (kg): The total yield was calculated after the end of the experiment and for each treatment.

5. Total Solids solution (T.S.S) : It was estimated by hand refractor meter.

6. Nitration elements percentage (K, P, N) and Fe amount.

Nitrogen element concentration in plant leaves was estimated by microkjedhal according to method of Black (1965) and nitrogen percentage was calculated by using the following equation:

$$N\% = \frac{\text{HCL acid consumer} \times \text{Acid titration} \times \text{total diluted sample digested volume} \times \text{Nitrogen atomic weight} \times 100}{\text{sample volume diagnostic placed in distillation room} \times \text{sample weight} \times 1000}$$

Phosphor was estimated by soft digestion method with used Ammonium molybdate and ascorbic acid in

spectrophoto meter [John (1970)]. Also calculated total potassium percentage (%) by flame photometer system according to Hesse (1971) method, besides estimated iron element by flame photometer according to Al-Nuaimi (1999).

2.2 Statistical Analysis

The factorial experiment was conducted according to the Randomized complete block design (R.C.B.D) with three replicates, and the averages were compared according to the least significant difference test at probability level of 0.05 and analyzed by GenStat program [Al-Rawi and Khalaf Allah (1980)].

3.1 Results and Discussion

The results in Table 2 showed that pomegranate trees treated by Floratone organic fertilizer was significantly excelled where the treatments 9 mg.L⁻¹ was excelled and gave highest average of traits (chlorophyll amount, total fruit yield and K.P.N. percentage) amounted to 41.73 mg.cm², 102.47 gm, 13.80 kg/tree, 1.77, 0.56 , 1.49%, respectively. While the treatment of 6 mg.L⁻¹ gave the highest average of traits (T.S.S and Fe) amounted to 185.89, 14.58%, respectively compared with the control treatment, which gave the lowest average for all the traits amounted to 39.01 mg/cm², 86.64, 10.32 kg/tree, 13.17, 1.61, 0.46, 1.36, 1.74.54%, respectively.

Where the fertilized treatment with ULTRAKELP 40 at a concentration of 30 ml.L⁻¹ significantly excelled and gave the highest average of traits (chlorophyll content, average of fruit weight, total yield, T.S.S., P, N, K, and Fe) amounted to 40.82 mg/cm², 100.49 gm, 13.79 kg/tree, 14.46, 1.76, 0.55, 1.84, and 183.00, respectively compared with untreated trees which gave the lowest average for all the traits amounted to 39.30 mg/cm², 92.83 g, 11.67 kg, 13.68%, 1.67 %, 0.48%, 1.41 %, 178.07 mg, respectively. The results of the same table also showed that the interaction between the factors of the experiment had a significant effect, as the treatment of interaction between (9mg.L⁻¹ Floratone and 30 ml.L⁻¹ Ultra Kelp 40) excelled and gave the highest values for all the studied traits (41.52 Mg/cm², 110.30 g, 14.93 g, 14.96 kg, 1.82 % ,0.60%, 1.52 %, 186.77 mg). The reason of significant increase is because these fertilizers contain necessary elements and amino acids to do bioactivities inside plant that lead to increase leaves content of chlorophyll which have an important role to build chlorophyll and prevent it from

Table 1: Floratone content.

Element	Alph Naphthyl Acetric Acid	Alph Naphthyl Acetamide	Sticknd and dispersing agents
Weight gm	4.5	12.5	35.0

Table 2: Effect of Floratone spraying and organic fertilizer (ULTRA KELP40) and overlaps on chemical properties and tree types of Salimi pomegranate Cultivar.

FLORATONE	ULTRA KELP40	Chlorophyll Mg/cm ²	Fruit weight gm	Total yield kg	T.S.S	N mg	P mg	K mg	Fe mg
0	0	37.71	85.00	9.62	12.69	1.56	0.43	1.31	172.03
	15	39.49	86.13	10.43	13.04	1.60	0.47	1.36	174.86
	30	39.84	88.80	10.92	13.77	1.66	0.48	1.43	176.33
3	0	38.69	93.27	11.90	13.46	1.69	0.47	1.42	173.67
	15	36.54	96.30	12.51	13.89	1.65	0.51	1.43	179.63
	30	40.40	96.93	14.40	14.16	1.73	0.54	1.43	187.70
6	0	39.22	96.50	12.60	14.38	1.69	0.51	1.43	185.60
	15	40.90	100.17	13.27	14.38	1.76	0.56	1.49	185.26
	30	41.53	106.23	14.90	14.96	1.81	0.59	1.54	186.79
9	0	41.56	96.95	12.56	14.17	1.72	0.52	1.48	180.96
	15	42.12	100.57	13.90	14.38	1.77	0.57	1.48	185.28
	30	41.52	110.30	14.93	14.96	1.82	0.60	1.52	186.77
L.S.D 0.05		2.84	2.01	0.51	0.21	0.03	0.02	0.03	0.84
Leaves level spraying floratone	0	39.1	86.64	10.32	13.17	1.61	0.46	1.36	174.54
	3	38.55	95.40	12.94	13.84	1.69	0.51	1.43	178.33
	6	40.55	100.97	13.59	14.58	1.75	0.55	1.49	185.89
	9	41.73	102.47	13.80	14.50	1.77	0.56	1.49	184.34
L.S.D 0.05		1.64	1.16	0.29	0.12	0.02	0.01	0.02	0.48
Altra kelp 40 spraying level	0	39.30	92.83	11.67	13.68	1.67	0.48	1.41	178.07
	15	39.76	95.79	12.53	13.92	1.70	0.53	1.44	181.26
	30	40.82	100.49	13.79	14.46	1.76	0.55	1.48	183.00
L.S.D0.05		1.42	1.01	0.25	0.11	0.02	0.01	0.02	0.42

damage [Issa *et al.* (2019)]. Also Floratone and Ultra kelp 40 contain important growth elements regulator and nitrogen, phosphor and potassium in order to installations including chlorophyll, nitrogen in amino acid installation and protein which also entering in biological parts like chloroplasts [Taiz and Zeiger (2006)]. In addition, phosphor element has role in increasing root growth that lead to increase the absorption of nutrients and increase their content in plant [Gobara *et al.* (2002)]. In addition, increasing iron element in plant leaves leads to cytochrome generating that is important for photosynthesis and respiration, iron is also included as enzymatic companion in chlorophyll molecule [Abdulrazzaq and Mohammed (2019)] which is consistent with Zainal (2018) and Al-Hayani and Qahar (2018).

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