



# ROLE OF SEAWEED EXTRACT SPRAY AND DATE PALM LEAVES COMPOST (DPLC) ON GROWTH AND LEAF MINERAL AND HORMONAL CONTENT OF MANGO TRANSPLANTS

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## Abstract

This study was conducted in the Department of Biology, Al-Rasheed University College- Baghdad during 2018-2019 growing season to investigate the influence of seaweed extract spray and date palm leaves compost (DPLC) on growth characteristics, leaf mineral and hormonal content of one year's old mango transplants. This study included two treatments: four levels of spraying of seaweed extract (super fifty) at 0 ( $A_0$ ), 1 ml.L<sup>-1</sup>( $A_1$ ), 2 ml.L<sup>-1</sup>( $A_2$ ) and 3 ml.L<sup>-1</sup>( $A_3$ ) and three levels of date palm leaves compost (DPLC), 0 ( $D_0$ ), 250 gm.Transplant<sup>-1</sup>( $D_{250}$ ) and 500 gm.Transplant<sup>-1</sup>( $D_{500}$ ) and their interaction. Treatments were replicated three times at factorial experiment in a RCBD. The number of transplants used was 36 transplant. The results showed that DPLC at 500 gm.Transplant<sup>-1</sup>( $D_{500}$ ) gave the highest leaves number of 11.37 leaf.plant<sup>-1</sup>, highest plant height of 27.97 cm, highest leaf nitrogen content of 1.172 and highest leaf GA content of 151.24  $\mu\text{g g}^{-1}$  FW. Also results showed that sprayed seaweed extract at levels 3 ml.L<sup>-1</sup> gave the highest leaves number of 10.77 leaf. Plant<sup>-1</sup>, highest plant height of 26.38 cm, leaf nitrogen content of 1.153 % and leaf IAA content of 43.82 $\mu\text{g g}^{-1}$  FW.

**Key words :** seaweed extract spray, Date palm leaves compost, growth and leaf mineral, hormonal content, Mango transplants.

## Introduction

Mangoes (*Mangifera indica* L.) belong to family Anacardaceae. Native to South Eastern Asia and considered one of the most important fruits of the tropical and sub tropical countries. Mango trees are evergreen and so they consume large amounts of nutrients per year as the best growth and yield requires the availability of micro and macro nutrients with perfect available (Paull and Duarte, 2011). The mango tree was planted in Iraq specifically in Basra province, where it was planted in Abu al-Khasib and Salihya, where there are large numbers planted among palm trees, as is noted in the home gardens in Basra province (Chakravarty, 1976). The acreage of mango in the world reached about 5681310 hectare, with production of 50649147 tons. The main producing countries are India then China, Indonesia, Pakistan and

Brazil (FAO, 2017). In general, Iraq's production is less compared to world production; therefore, it is necessary to care for trees, including fertilization, especially in the early stages of tree growth to obtain a high yield at the fruiting. The use of marine algae or seaweed extracts has received a lot of attention recently because of the increasing interest in the environment and the emphasis on clean agriculture. These extracts are non-toxic to the user by their biological nature and are environmentally friendly and leave no residue on the plant and soil. In agricultural production, they are a partial substitute for or complementary to chemical fertilizers as they improve and increase the efficiency of fertilizers and thus contribute to lower production costs (Khan *et al.*, 2009 and Zamani *et al.*, 2013). Several studies have been conducted on the role of these extracts in the growth of fruit trees, Ibrahim *et al.*, (2015) found the growth, total

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chlorophylls, N, P and K in the leaves of Keitte mango trees in response to foliar application of seaweed extract at 10%, Al-Rawi *et al.*, (2016) recorded that, highest content of leaves dry weight, chlorophyll, carbohydrates and zinc it was in “Peento” peach cultivar treated with seaweed extract at 4 ml.L<sup>-1</sup> as foliar spray, Al-Hadethi and AL- Dulaimi ( 2019) found that application of seaweed extract spray lead to increased of growth and leaves mineral content in olive transplants, Al-Marsoumi and Al-Hadethi (2020) conducted study to investigate the influence of humic acid and seaweed extract spray on one year’s old trees of “qalib al-thor” mango cultivar included four levels of spraying of seaweed extract (Acadian), 0, 2, 3 and 4 ml.L<sup>-1</sup>; showed that seaweed extract at levels 4ml.L<sup>-1</sup> gave the highest leaf nitrogen, potassium, iron and the highest leaf zinc content.

The use of horticulture wastes as compost could be of a positive impact on plant growth. Abdel-Nasser and Harhash (2001) noted that compost was more efficient in improving soil physical and chemical characteristics and enhancing growth of olive trees. Therefore, these media are recommended for olive cultivation under the arid and semi-arid regions, which are limited in water resources, especially sandy soil. Haggag *et al.*, (2014) found a significant increase in plant height, leaves number, of one year’s old trees of “Aggizi” olive cultivar, when adding compost at three levels (0, 15 and 30) cm<sup>3</sup>.transplant<sup>-1</sup>. In addition, Al-Hadethi *et al.*, (2015) found that application of four levels of date palm leaves compost (DPLC) to soil lead to increase of leaves area and leaves mineral content in fig transplant especially when added level 4 kg. Transplant<sup>-1</sup>. Al-Dulaimi (2019) also found that the addition of compost prepared from date palm leaves to soil and addition of compost prepared from the residues of wheat to soil as compared with control treatment, resulted in an increase in leaves number, increase in transplants height, leaf nitrogen content and leaf hormonal content. Due to few of similar studies in Iraq, this study aims to determine the effect of compost and seaweed extract on vegetative growth and leaf mineral and hormonal content of mango transplants.

## Materials and Methods

This study was conducted in the Department of Biology, Al-Rasheed University College- Baghdad during 2018-2019 growing season to investigate the influence of seaweed extract spray and date palm leaves compost (DPLC) on growth characteristics, leaf mineral and hormonal content of one year’s old mango transplants. This study included two treatments: four levels of spraying of seaweed extract (super fifty) at 0 (A<sub>0</sub>), 1 ml.L<sup>-1</sup>(A<sub>1</sub>),

2 ml.L<sup>-1</sup>(A<sub>2</sub>) and 3 ml.L<sup>-1</sup>(A<sub>3</sub>) and three levels of date palm leaves compost (DPLC), 0 (D<sub>0</sub>), 250 gm.Transplant<sup>-1</sup>(D<sub>250</sub>) and 500 gm.Transplant<sup>-1</sup>(D<sub>500</sub>) and their interaction. Treatments were replicated three times at factorial experiment in a RCBD. The number of transplants used was 36 transplant. The following parameters were determined in the two successive seasons:

1. A leaves number.
2. Increased of plant height (cm): Calculated at the beginning of the experiment in December and at the end of the last week of May.
3. Leaves mineral content: Leaves samples were collected for chemical analysis at the 2<sup>nd</sup> week of June. Each sample consisted of 10 leaves.Tree<sup>-1</sup>. Leaves were washed with tap water, rinsed with distilled water, and then dried at 70°C until a constant weight, ground and digested according (Chapman, and Pratt, 1978). Nitrogen was estimated by micro-kjeldahl method of (A.O.A.C, 1980). Phosphorus was estimate the chromatic by using spectrophotometer by (Estefan *et al.*, 2013).
4. Leaves hormonal content (IAA, and gibberellins) were assayed according to (Inyayar *et al.*, 1996).

The obtained results were subjected to analysis of variance according to (Elsahookie and Wuhaib, 1990) using L.S.D 0.05 for comparing differences between various treatment means.

## Results and Discussion

### Effects of seaweed extract spray and Date palm leaves compost (DPLC) and their interaction on leaves number and plant height

Data concerning the effect of treatments on leaves number and plant height are listed in Table (1). The data cleared that DPLC at 500 gm.Transplant<sup>-1</sup>(D<sub>500</sub>) significantly increased and gave the highest leaves number of 11.37 leaf.plant<sup>-1</sup> and highest plant height of 27.97 cm. (Table 1) also shows that sprayed seaweed extract at levels 3 ml.L<sup>-1</sup>significantly superiority of the control treatment and gave the highest leaves number of 10.77 leaf.plant<sup>-1</sup> and highest plant height of 26.38 cm.

### Effects of seaweed extract spray and Date palm leaves compost (DPLC) on leaf N, P, IAA and GA<sub>3</sub> content

Data concerning the effect of treatments on leaves N, P, IAA and GA content are listed in (Table 2). The data cleared that DPLC at 500 gm.Transplant<sup>-1</sup>(D<sub>500</sub>) significantly increased and gave the highest leaf nitrogen content of 1.172 %, highest leaf IAA content of 45.49 µg

**Table 1:** Effects of seaweed extract spray and Date palm leaves compost (DPLC) and their interaction on leaves number and plant height of mango transplants.

Sea	Leaves number				Plant height (cm)			
	DPLC				DPLC			
	0	250	500	Mean	0	250	500	Mean
0	7.33	8.66	9.50	8.50	21.78	22.56	24.55	22.96
1	7.66	9.00	11.33	9.33	22.20	23.90	27.83	24.64
2	8.33	9.33	12.00	9.89	22.70	24.13	29.15	25.33
3	9.00	10.66	12.66	10.77	23.81	24.97	30.36	26.38
Mean	8.08	9.41	11.37		22.62	23.89	27.97	
L.S.D 5%	Sea	DPLC	Int.		Sea	DPLC	Int.	
	0.56	0.48	0.96		0.65	0.56	1.12	

**Table 2:** Effects of seaweed extract spray and Date palm leaves compost (DPLC) and their interaction on leaf N, P, IAA and GA<sub>3</sub> content of mango transplants.

Sea	N (%)				P (%)			
	DPLC				DPLC			
	0	250	500	Mean	0	250	500	Mean
0	1.121	1.130	1.156	1.136	0.143	0.152	0.154	0.150
1	1.130	1.149	1.169	1.149	0.148	0.151	0.150	0.150
2	1.134	1.151	1.155	1.143	0.148	0.147	0.141	0.145
3	1.137	1.154	1.207	1.166	0.150	0.145	0.158	0.151
Mean	1.131	1.144	1.172		0.147	0.149	0.151	
L.S.D 5%	Sea	DPLC	Int.		Sea	DPLC	Int.	
	0.018	0.016	0.032		N.S	N.S	N.S	
IAA ( $\mu\text{g g}^{-1}$ FW)				GA ( $\mu\text{g g}^{-1}$ FW)				
0	33.31	34.96	37.68	35.32	97.38	103.87	130.90	110.72
1	33.76	35.80	42.60	37.39	99.11	110.56	143.27	117.65
2	35.11	38.87	48.84	40.94	103.12	121.37	161.70	128.73
3	35.89	42.75	52.82	43.82	106.46	132.45	169.08	136.00
Mean	34.52	38.10	45.49		101.52	117.06	151.24	
L.S.D 5%	Sea	DPLC	Int.		Sea	DPLC	Int.	
	5.01	4.34	8.68		6.74	5.84	11.68	

$\text{g}^{-1}$  FW and highest leaf GA content of  $151.24 \mu\text{g g}^{-1}$  FW, while DPLC did not affect on leaf phosphor content. (Table 2) also shows that sprayed seaweed extract at levels  $3 \text{ mL L}^{-1}$  significantly superiority of the control treatment and gave the highest leaf nitrogen content of 1.153 %, leaf IAA content of  $43.82 \mu\text{g g}^{-1}$  FW and highest leaf GA content of  $136.00 \mu\text{g g}^{-1}$  FW. These results are due to the effect of seaweed extract on increasing the percentage of zinc and potassium to contain the major nutrients, especially the N, P and K, as well as the microelements, which are absorbed directly when sprayed on the leaves and thus increase its percentage in the plant (Martin, 2012).

These results may revert to the role of compost in improving the quality of the soil and increase the content

of nutrients that utilized in the plant growth, especially nitrogen component (Al-Hadethi *et al.*, 2015), The addition of compost have role in reducing the pH soil (Al-Hadethi *et al.*, 2015) and then plant able to absorb nutrients easily, as the alkaloid soil reduces the absorption of many nutrients (Mengel, 2001).

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