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Effect of Organic Treatment on Growth and Leaves Mineral and Hormonal Content in Plum Trees

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ABSTRACT
This experiment was conducted in plum orchard affiliated to Researches Station A - College of Agricultural Engineering science / University of Baghdad for the season 2020 on "Hollywood" plum trees to study the effect of adding liquid organic fertilizer vit -org and spraying plant extracts (turmeric, ginger) on growth and leaf mineral and hormonal content. The treatments were designed with a factorial experiment within RCBD design ,that included adding liquid organic fertilizer with three levels (0,30,60) ml. tree^{-1} and plant extracts spray with two levels (10,20) g. L^{-1} for each of them and control treatment. The results showed that the addition of liquid organic fertilizer vit-org had a significant effect on vegetative growth characteristics especially as the treatment O_{60} (60 ml. Tree^{-1}) was significantly superior in most of the studied traits. spraying with plant extracts (turmeric and ginger) led to a significant increase in the studied traits, as the spraying treatment T_{20} (20 g. L^{-1}) outperformed in shoot nitrogen content and leaf area as for the spray treatment of G_{20} (20 g. L^{-1}), it excelled in leaf dry weight,leaf chlorophyll content and leaf zinc content . The interactions between the study factors had a significant effect on the studied traits, as the two interaction treatments ($O_{60}T_{20}$) and ($O_{60}G_{20}$) gave clear significant differences in most of the studied traits.
Keywords: Organic Treatment, Leaves Mineral, Hormonal Content, Plum Trees

Introduction:
Japanese plum *prunus salicina L*. belongs to the Rosaceae family (1). The true history of the Japanese plum tree dates back to 300 BC in China (13). Other sources indicated that the origin of Japanese plums is China, and varieties of it were transferred to Japan around 1500 AD (3). As the world production of plum fruits in 2019 reached about (12,601,312) tons, and the total area planted in it was (2,727,745) hectares. China is ranked first in the world in the production of plums, as its production reached (6,995,738) tons, which represents more than half of the world production ,followed by Romania ,Serbia , Iran and United States of America in fifth place, as its production for the same year reached (340,010) tons (10). The number of fruitful plum trees in Iraq is estimated at about (473,109) trees and their production was approximately (15,351) tons, and the general average per tree was about (32.45) kg, and that Salah al-Din Governorate was the first among the Iraqi governorates in terms of production and it was about (10451) tons of the total production of Iraq, followed by the Baghdad (7) . During the last two decades it has been observed that

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there has been a significant decrease in the number of plum trees, as well as the productivity of one tree (7). Not to fertilize with organic or mineral fertilizers in correct doses according to scientific bases. Organic fertilizers have great benefit when added to the soil, as they reduce nitrogen loss upon decomposition and facilitate the movement of nutrients to the root spread area for absorption and utilization, as well as effect pH of the soil, which is reflected in the amount of beneficial microbes that contribute to increasing crop growth and productivity (22) . In recent times, plant extracts have been widely used as a substitute or supplement for agricultural fertilizers, some of which are added to the soil or sprayed on the shoots, as they are characterized by containing some nutrients and some compounds that combat insect and pathological infections in addition to their work as an alternative to growth regulators. Among these extracts are turmeric, ginger , onion, Garlic, moringa, licorice, and algae (6) . (18) noted that the addition of different organic fertilizers to 10-year-old to " Canino " Apricot trees had an effect on some of the vegetative growth characteristics and leaves chlorophyll content in a significant and clear manner, as the treatment of adding better algae extract was recorded, followed by the treatment of poultry extract. (5) found through a study he carried out on effect of adding poultry manures and spraying with licorice and turmeric extracts on pomegranate trees at four-year-old Salemi cultivar in vegetative growth, and leaves mineral content, where the turmeric extract had a concentration of (10 g. L^{-1}) A clear significant effect in the increase in branches length, leaf area and leaves mineral content . (16) proved that spraying " Valencia " orange trees with plant extracts, including ginger extract, three times at concentrations (0.025, 0.05, 0.1%) gave good stimulation to some vegetative growth characteristics, including leaf area compared to control treatment .The aims of this study to know the role of liquid organic fertilizer and plant extracts spray (turmeric, ginger) in growth and leaf mineral and hormonal content of "Hollywood".

Materials and methods:

This experiment was conducted in plum orchard affiliated to the Research Station A / College of Agricultural Engineering Sciences / University of Baghdad for the season 2020 on four years "Hollywood" cultivar plum, as 48 homogeneous tree were planted in their vegetative growth to study the role of vit-org liquid organic fertilizer and plant extracts spraying on growth and leaf mineral and hormonal content of plum trees. At the beginning of February 2020. The experiment was carried out with a factorial experiment within R C B D at three replications , one tree for each experiment unit, the number of trees in this experiment was 45 trees. Adding liquid organic fertilizer (vit-org) to the soil at three levels (0,30,60) ml.$trees^{-1}$ and plant extract spray ,turmeric and ginger at five levels (0,10gm.turmeric L^{-1},20gm.turmeric L^{-1},10gm.ginger L^{-1} and 20gm. Ginger L^{-1}). The following traits was studies:

1-Increase in stem diameter (cm) .

On 1/4/2020 stem diameter was measured by vernier before the start of experiment, as well as at the end of growing season on 31/12/2020, and the difference between the two measurements, which represents the increase in stem diameter

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2-Increase in shoot length (cm) .

Three shoots were selected from each tree, and their lengths were measured by metric tape before starting experiment on 1/4/2020, and same branches were also re-measured at end of the season on 31/12/2020 and difference between two measurements was calculated, which represents the increased in shoot length.

3-Leaves dry weight (%) .

Ten leaves were taken from the experimental unit in last week of June, when dust was removed from them and cleaned well using water and then dried with a piece of cloth and wet weight was taken and placed in paper bags and then dried by an electric(oven) At a temperature of 70 ° C until the weight was fixed, after which it was taken out and weighed with a sensitive scale and then the percentage matter was calculated according (2) to the following equation:

Leaves dry weight % = (dry sample weight / wet sample weight) * 100

4- Leaves nitrogen content (%) .

The percentage of Nitrogen element was calculated in Micro-Kjeldahl (8) .

5- Leaves phosphor content % .

percentage of element phosphors was calculated using a spectrophotometer (21) .

5- Leaves GA_3 content .

GA_3 leaves content was determined using HPLC technology (23) .

Results and discussion :

1-vgetative growth characterstics :

The results in Tables (1,2,3) indicate that adding liquid organic fertilizer vit-org to plum trees at a concentration of 60 ml. $tree^{-1}$(O_{60}) gave the highest increase in stem diameter, branch length and leaves dry weight, as it gave 3.45 cm, 27.00 cm and 55.19. % Respectively, while the control (O_0) treatment gave the lowest results for these characteristics. The results of Table (1) also indicate that spraying with plant extracts had a significant effect in increase in stem diameter at a concentration of 10 g. L^{-1} (G_{10}), as it gave 3.20 cm. Table (2) indicates the effect of plant extracts had a significant effect on branch length at especially a level of 20 g. L^{-1} (T_{20}) as it gave 26.46 cm . Table (3) also indicated that there was a significant difference in leaves dry weight especially at 20 g. L^{-1} (G_{20}), as it gave 55.40% compared to control treatment . These results are due to the role played by the liquid organic fertilizer vit-org in the physiological processes by encouraging the action of enzymes and the transfer of the products of the photosynthesis process in addition to its role in cell division and elongation, which greatly affected the nutritional status of trees (4) ,as well as It works to increase the chemical and biological of soils by increasing the activities of various enzymes of importance in soil fertility (14), which reflected positively on shoot carbohydrate content, which is due to the increase in most vegetative characteristics. Its effect on growth traits Vegetative may be due to its content of macro and micro elements and plant hormones that have an effective role in increasing vegetative characteristics by absorption large amounts of the elements present in soil. These results are consistent with (19) when spraying Ewaise mango trees with turmeric extract and (11) when spraying Valencia cultivar orange trees with ginger extract. .

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Table 1. effect of liquid organic fertilizer and turmeric and ginger extracts spray on increase in stem diameter (cm) of "Hollywood" plum trees.

	E_0	T_{10}	T_{20}	G_{10}	G_{20}	Mean
O_0	1.66	3.42	3.11	2.26	2.78	2.65
O_{30}	2.33	2.64	3.23	3.24	3.50	2.99
O_{60}	3.90	3.11	3.00	4.10	3.15	3.45
L.S.D 5%	0.42					0.19
Mean	2.63	3.06	3.11	3.20	3.14	
	0.24					

Table 2. effect of liquid organic fertilizer and turmeric and ginger extracts spray on branches length (cm) " Hollywood" plum trees .

	E_0	T_{10}	T_{20}	G_{10}	G_{20}	Mean
O_0	13.40	15.50	21.14	17.71	19.60	17.47
O_{30}	17.64	23.80	27.05	20.47	23.09	22.41
O_{60}	19.90	28.70	31.20	27.80	27.41	27.00
L.S.D 5%	9.10					4.07
Mean	16.98	22.67	26.46	21.99	23.37	
	5.25					

Table 3. effect of liquid organic fertilizer and turmeric and ginger extracts spray on leaves dry weight (%)of " Hollywood" plum trees .

	E_0	T_{10}	T_{20}	G_{10}	G_{20}	Mean
O_0	54.19	54.40	54.78	54.60	55.19	54.63
O_{30}	54.46	54.62	55.20	54.81	55.38	54.89
O_{60}	55.02	54.83	55.37	55.10	55.63	55.19
L.S.D 5%	0.78					0.35

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Mean	54.56	54.62	55.12	54.84	55.40	
	0.45					

2- Leaves mineral and GA_3 content :

The results indicated in Tables (4,5,6) that adding liquid organic fertilizer vit-org to plum trees at 60 ml. Tree $^{-1}$ (O_{60}) had a significant effect in leaves content of nitrogen, phosphor and gibberellins, as it gave 1,351%. , 0.394% and 139.8 g. 100 gm^{-1} fresh weight respectively, while the control treatment gave less of these results. Tables (4,5) also indicate that spraying with plant extracts especially of 20 g. L^{-1} (T_{20}) was significantly superior in leaves nitrogen and phosphor content , as it gave 1.335% and 0.443% for both nitrogen and phosphorous respectively. Table (6) indicated. The treatment of spraying with ginger extract at the level of 20 g. L^{-1} (G_{20}) significantly exceeded in leaves,GA_3 content as it gave 139.8 µg. gm^{-1} fresh weight compared to the control treatments. These results are due to the contents of the liquid organic fertilizer vit-org of compounds rich in polysaccharides and its high concentration of nitrogen and organic potassium and amino acids that increase the leaves' content mineral and hormonal (12) . These results are consistent with (15) when treating Hamsagar mango trees with liquid organic fertilizer. As for the role played by plant extracts, which is due to their containing secondary metabolites of high importance such as glycosides, phenols and other important biological compounds in addition to the primary metabolites that stimulate cell division and protect them from the harmful effects of temperature and photo oxidation (20) . These results are consistent with (9) when spraying orange trees with turmeric extract and (17) when spraying Le-Conte pear trees with ginger extract.

Table 4. effect of liquid organic fertilizer and turmeric and ginger extracts spray on leaves nitrogen content (%) of "Hollywood" plum trees .

	E_0	**T_{10}**	**T_{20}**	**G_{10}**	**G_{20}**	**Mean**
O_0	1.141	1.278	1.305	1.226	1.285	1.249
O_{30}	1.216	1.258	1.287	1.241	1.265	1.253
O_{60}	1.253	1.396	1.414	1.336	1.356	1.351
L.S.D 5%	0.096					0.043
Mean	1.203	1.314	1.335	1.268	1.302	
	0.056					

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Table 5. effect of liquid organic fertilizer and turmeric and ginger extracts spray on leaves phosphor content (%) of "Hollywood" plum trees .

	E_0	T_{10}	T_{20}	G_{10}	G_{20}	Mean
O_0	0.233	0.329	0.419	0.302	0.347	0.326
O_{30}	0.309	0.367	0.445	0.332	0.385	0.368
O_{60}	0.334	0.401	0.465	0.357	0.415	0.394
L.S.D 5%	0.047					0.021
Mean	0.292	0.366	0.443	0.330	0.382	
	0.027					

Table 6. Effect of liquid organic fertilizer and turmeric and ginger extracts spray on leaves content of GA_3 ($\mu g.\ gm^{-1}$ fresh weight) of "Hollywood" plum trees.

	E_0	T_{10}	T_{20}	G_{10}	G_{20}	Average
O_0	120.1	125.8	135.5	126.1	136.2	128.7
O_{30}	123.9	131.0	138.3	132.6	139.9	133.1
O_{60}	131.8	140.7	142.0	141.1	143.2	139.8
L.S.D 5%	6.35					2.84
Average	125.3	132.5	138.6	133.3	139.8	
	3.67					

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