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Improve Growth and Productivity of Fig Trees (*Ficus carica* L.) by Using Natural Compounds

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Abstract

This study was carried out to study the effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on the growth and productivity of fig trees. The trees were treated with three levels of foliar spray with each of Urtica Dioica at 0, 150 and 300 mg L^{-1} and the Prosopis Farcta at 0, 150 and 300 mg L^{-1}, and humic acid 0, 200 and 300 mg L^{-1}. Treatments were applied twice. The first foliar spray was applied on May 1st, 2022, and the second one on June 1st, 2022. One tree was used for each experimental unit in a factorial experiment with three replications. The research came to the following results: foliar spray with Urtica Dioica, especially at 300 mg L^{-1} led to a significant increase in all studied characters (leaf area, leaves carbohydrate, TSS, fruit weight and total yield) except total chlorophyll content and total acidity. Foliar spraying of Prosopis Farcta at 300 mg L^{-1} led to a significant increase in all studied characters (total chlorophyll content, leaf area, leaves carbohydrate, TSS, fruit weight and total yield) except total acidity.Foliar spraying of humic acid at 300 mg L^{-1} led to a significant increase in some studied characters (leaf area, leaves carbohydrate, TSS, fruit weight). There was a significant rise in the binary and triple interactions of the study treatments on all the traits examined, particularly at high study factor levels (300 mg L^{-1} Urtica Dioica, 300 mg L^{-1} Prosopis Farcta and 300 mg L^{-1} Humic acid).

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Introduction

The fig (*Ficus carica* L.) tree is a ficus plant belonging to the Moraceae family. It grows quickly and has large branches and leaves. It is a perennial deciduous shrub. The fig tree is a vigorous and highly productive traditional medicinal plant that can adapt well to weather changes. (Abdel-Aty *et al*., 2019). The fig is a species that has been bred and cultivated all over the world, it thrives mainly in warm and dry regions, and it is regarded as one of the species cultivated by the most ancient human races. (Barolo *et al.*, 2014). Plant extracts are utilized as liquid organic fertilizers and contain elements that enhance natural processes that promote plant growth (Godlewska *et al*., 2020). Bio stimulants are compounds that enhance plant nutrient uptake, improve plant tolerance to stress, have a favorable impact on their main and secondary metabolism, alter plant physiological processes, as well as their yield. (Bulgari *et al*., 2017) The family Urticaceae includes the perennial wild plant known as nettle (*Urtica Dioica* L.). The stalks and leaves of nettles are a good source of minerals (calcium, iron, potassium, magnesium), vitamins A, B, and C, and also pigments, including carotenoids and

chlorophyll (Guil-Guerrero *et al*., 2003; Repajic *et al*., 2020). Nettle roots are a rich source of sterols, protein lectin, polysaccharides, phenols, and lignans (Orčić *et al*., 2014). Nettle (*Urtica dioica* L.) is still a widely underutilized plant source of many useful chemicals despite its many benefits. The concentration of physiologically active compounds in nettle tissues determines its value. These are materials that actively contribute to the control of the plant organism's physiological processes. They are in charge of improving seed establishment, enhancing plant immunity, and resistance to a variety of unfavorable environmental variables (drought, changes in temperature, soil salinity, or acidity) (Langa-Lomba *et al*., 2021). Lajnef *et al*. (2015) reported that Prosopis Farcta seeds are easy to utilize and include protein and unsaturated fatty acids. Prosopis faracta is a plant that is rich in phenolic compounds, including derivatives of caffeic acid and flavonoids like rutin and myricetin. (Skhiri Harzallah and Ben Jannet, 2005). Humic acid is one of the bio-stimulants, or organic materials, that help trees tolerate severe circumstances and encourage plant growth. Is a great benefit for trees and the soil since it promotes healthy plant growth and increases nutrient uptake, tolerance to drought and temperature extremes, activity of beneficial soil microorganisms, and availability of soil nutrients, especially in alkaline soils and low organic matter. (Eisa *et al*., 2016; Abd El-Razek *et al*., 2018). Ashwini *et al*. (2022) reported that the application of humic acid increases production by promoting photosynthesis. Furthermore, in the 'Anna' apple, Humic acid decreased the percentage of fruit drop rate and acidity while increasing shoot length and diameter, leaf area, fruit weight, dimensions, firmness, anthocyanin content and total soluble solids (Mosa *et al*., 2015). El-Kosary *et al*. (2011) reported that the 'Ewais' mango fruit had reduced acidity but enhanced fruit TSS and total sugars. The purpose of this study was to investigate how Urtica Dioica, Prosopis Farcta extract, Humic and their interactions affected some vegetative growth characteristics and productivity of Fig trees cultivar Benati.

Materials and Methods

This study was conducted in a private orchard on homogeneous fig trees (*Ficus carica* L.) Binati cv, which were eight years old and cultivated in silty clay soil, is located at Gavarky, the center of Duhok city during the growing season 2022. This orchard is considered an irrigated orchard. This orchard is located at an elevation of 485.836 meters above sea level (Latitude: 36˚50'47.5"N and longitude: 42˚57' 3.2" E). Healthy, and almost uniform fig trees were selected, the distance between trees was 3 * 4 m, by using 81 trees and they are almost in one age and analogous in the growth. Trees were all sprayed with three different concentrations of Urtica Dioica at 0, 150 and 300 mg L^{-1}, and Prosopis Farcta at 0, 150 and 300 mg L^{-1}, and humic acid 0, 200 and 300 mg L^{-1} each respectively. Treatments were applied twice. The first foliar spray was applied on May 1st, 2022, and the second one on June 1st, 2022. Tween-20 was utilized as a wetting agent and treatments were manually sprayed to the point of runoff.

Statistical Analysis

A factorial experiment within a randomized complete block design (RCBD) comprised of 27 treatments with three replications and one tree for each experimental unit. Using the SAS program

(SAS, 2002). The Duncan Multiple Range test was used to compare the differences between the various treatment means at the 5% level (Barr *et al.,* 1979).

The parameters measured in this study, were determined at the end of the growing season during the first week of September. Total leaf chlorophyll content (SPAD unit) was measured in the field by using Minolta chlorophyll meter SP AD-502. Leaf area (cm^2) was measured according to the method of (Shamkhi and Obaied, 2016) while leaves carbohydrate % was estimated by using spectrophotometer according to the method of Herbert *et al.* (1971). Fruit weight (g), tree yield (kg/tree), and total soluble solids (TSS%) were determined according to the method of (Ranganna, 1977). Total acidity (TA %) was estimated for fruit as a percentage of tartaric acid in fresh weight according to the method of A.O.A.C. (2000)

Results and Discussion

Total Leaf Chlorophyll Content (SPAD unit)

Results in Table 1 clarified that foliar spray of Urtica Dioica (UD) at 0 mg L^{-1} (control), Prosopis Farcta (PF) at 300 mg L^{-1} and Humic acid (HA) at 200mg L^{-1} recorded the chlorophylls highest value 50.57, 50.10 and 50.49. Adjacent to the influence of interaction between Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta+ Humic acid, significantly affected on chlorophylls content, the maximum value 51.38, 51.26 and 50.90, was obtained when fig trees were treated with 0 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta (PF), 0 mg L^{-1} Urtica Dioica (UD) + 200 mg L^{-1} Humic acid and 150 mg L^{-1} Prosopis Farcta (PF) + 0 mg L^{-1} Humic acid, respectively. Results of Urtica Dioica, Prosopis Farcta and Humic acid interaction, indicated that the interaction among 150 mg L^{-1} Urtica Dioica (UD) + 150 mg L^{-1} Prosopis Farcta + 200 mg L^{-1} Humic acid recorded the maximum chlorophyll content, 53.43, it was the best effective treatment. Whereas the interaction among 150 mg L^{-1} Urtica Dioica (UD) + 150 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid produced the lowest value 45.60.

Table 1. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions, on total leaf Chlorophyll content (SPAD unit) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	48.40 e-i	51.47 a-d	51.77 a-d	50.54 ab	50.57 A
	150	51.47 a-d	50.70 b-f	47.20 h-j	49.79 bc	
	300	53.40 a	51.60 a-d	49.13 d-i	51.38a	
150	0	49.70 c-h	46.87 ij	48.00 h-j	48.19 d	49.41 B
	150	50.17 b-g	53.43 a	45.60 j	49.73 bc	
	300	47.87 h-j	52.80 ab	50.30b-g	50.32 ab	
300	0	49.73 c-h	52.20 a-c	52.13 a-c	51.36 a	49.54 B
	150	51.07 a-d	48.17 f-j	46.80 ij	48.68 cd	
	300	47.77 g-j	47.17 h-i	50.87 a-e	48.60 cd	
Humic acid		49.95 A	50.49 A	49.09 B	Prosopis Farcta	

Urtica Dioica * Humic acid	0	51.09 a	51.26 a	49.37 b		
	150	49.24 bc	51.03 a	47.97 c		
	300	49.52 b	49.18 bc	49.93 ab		
Prosopis Farcta * Humic acid	0	49.28 b	50.18 ab	50.63 ab	0	50.03 A
	150	50.90 a	50.77 a	46.53 c	150	49.40 A
	300	49.68 ab	50.52 ab	50.10 ab	300	50.10 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

Leaf area (cm^2)

Table 2 determines that foliar spray of Urtica Dioica (UD) at 300 mg L^{-1}, Prosopis Farcta at 300 mg L^{-1} and Humic acid at 300 mg L^{-1} recorded the highest significant value of leaf area 358.50, 360.28 and 360.83 cm^2. Regarding the impact of the interaction between Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acidgive a significant impact on leaf area, and record the highest value 365.26, 367.73 and 363.47 cm^2, respectively which was obtained by treating fig trees with 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta (PF), 300 mg L^{-1} Urtica Dioica (UD) + 300 mg L^{-1} Humic acid and 300 mg L^{-1} Prosopis Farcta (PF) + 150 mg L^{-1} Humic acid. Results of Urtica Dioica, Prosopis Farcta and Humic acid interaction, indicated that the interaction among 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} humic acid produced the highest leaf area it, was the most effective treatment because it 370.95 cm2, while the interaction between 300 mg L^{-1} Urtica Dioica + 0 mg L^{-1} Prosopis Farcta + 0 mg L^{-1} Humic acid recorded the least value 327.10 cm^2.

Table 2. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on Leaf area (cm^2) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	346.73 ij	350.15 g-j	355.33 d-i	350.74 cd	352.10 C
	150	347.30 h-j	352.27 f-i	353.82 e-i	351.13 cd	
	300	349.90 g-j	357.75 c-g	355.64 c-i	354.43 bc	
150	0	342.20 j	348.65 g-j	356.36 c-h	349.07 d	355.36 B
	150	347.05 ij	360.07 b-f	360.48 b-f	355.87 b	
	300	356.22 c-h	364.56 a-c	362.67 a-e	361.15 a	
300	0	327.10 k	353.84 e-i	364.68 a-c	348.54 d	358.50 A
	150	354.07 e-i	363.43 a-d	367.57 ab	361.69 a	
	300	356.73 c-g	368.10 ab	370.95 a	365.26 a	
Humic acid		347.48 C	357.65 B	360.83 A	Prosopis Farcta	
Urtica Dioica * Humic acid	0	347.98 d	353.39 c	354.93 c		
	150	348.49 d	357.76 bc	359.84 b		
	300	345.97 d	361.79 b	367.73 a		
Prosopis Farcta * Humic acid	0	338.68 e	350.88 cd	358.79 ab	0	349.45 C
	150	349.47 d	358.59 ab	360.62 a	150	356.23 B
	300	354.28 bc	363.47 a	363.09 a	300	360.28 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

Leaves carbohydrate (%)

Table 3 clearly shows that foliar spray of Urtica Dioica at 300 mg L^{-1}, Prosopis Farcta at 300 mg L^{-1} and Humic acid at 300 mg L^{-1} gave the highest significant values of leaves carbohydrate 10.08, 9.82 and 9.97 % compared with other treatment. The interaction; among Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acid showed that there was a significant influence on leaves carbohydrate, the highest values 10.74, 10.86 and 10.55 % were obtained at 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta, 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Humic acid and 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid correspondingly. Considering the effect of the interaction of Urtica Dioica, Prosopis Farcta and Humic acid, the maximum leaves carbohydrate of 11.54 % was acquired when fig trees was treated with 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta + 300mg L^{-1} Humic acid was significantly higher leaves carbohydrate comparing to other interaction. Additionally, the control treatment produced the lowest value 7.37 %.

Table 3. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions; on Leaves carbohydrate (%) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	7.37 i	8.55 f-i	8.58 f-i	8.17 d	8.35 C
	150	7.63 hi	8.20 g-i	8.82 e-h	8.22 d	
	300	8.16 g-i	8.81 e-h	9.04 d-g	8.67 d	
150	0	8.26 f-i	9.00 d-g	9.33 d-g	8.86 cd	9.46 B
	150	8.52 f-i	9.60 c-f	10.32 a-d	9.48 bc	
	300	9.03 d-g	10.03 b-e	11.06 ab	10.04 b	
300	0	8.93 e-h	9.06 d-g	10.35 a-d	9.45 bc	10.08 A
	150	9.98 b-e	9.47 c-g	10.69 a-c	10.05 b	
	300	10.71 a-c	9.97 b-e	11.54 a	10.74 a	
Humic acid		8.73 C	9.19 B	9.97 A	Prosopis Farcta	
Urtica Dioica * Humic acid	0	7.72 e	8.52 d	8.82 d		
	150	8.60 d	9.54 bc	10.24 ab		
	300	9.87 bc	9.50 c	10.86 a		
Prosopis Farcta* Humic acid	0	8.19 e	8.87 c-e	9.42 b-d	0	8.83 C
	150	8.71 de	9.09 cd	9.95 ab	150	9.25 B
	300	9.30 b-d	9.60 bc	10.55 a	300	9.82 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

Fruit weight (g)

Table 4 explained that the foliar spray of Urtica Dioica at 300 mg L^{-1}, Prosopis Farcta at 300 mg L^{-1} and Humic acid at 300 mg L^{-1} significantly increased fruit weight which recorded 75.82, 72.28 and 69.95 g respectively in comparison with other treatment. The interactions of Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acid have a significant effect on fruit weight, the highest value 82.38, 77.79 and 73.42 g came from the interaction of 300mg L^{-1} Urtica Dioica

+ 300 mg L^{-1} Prosopis Farcta, 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Humic acid and 300 mg L^{-1} Prosopis Farcta + 300 mg.L^{-1} Humic acid. The interaction, among Urtica Dioica, Prosopis Farcta and Humic acid, had significant differences among the mean of fruit weight, the maximum fruit weight of 83.51 g was obtained at the interaction of 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid. Whereas the control treatment gave the lowest fruit weight value of 54.68 g.

Table 4. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on Fruit weight (g) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica *Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	54.68 h	61.94 fg	60.50 g	59.04 e	62.16 C
	150	61.94 fg	61.65 fg	61.63 fg	61.74 e	
	300	64.61 d-g	65.50 d-g	67.01 d-g	65.70 d	
150	0	64.06 e-g	66.95 d-g	67.85 d-f	66.28 d	67.88 B
	150	68.12 d-f	68.28 c-f	69.49 c-e	68.63 cd	
	300	68.67 c-e	67.83 d-f	69.73 c-e	68.74 cd	
300	0	69.53 c-e	69.95 c-e	70.91 cd	70.13 c	75.82 A
	150	71.01 cd	74.84 bc	78.96 ab	74.94 b	
	300	81.17 a	82.48 a	83.51 a	82.38 a	
Humic acid		67.09 B	68.82 AB	69.95 A	Prosopis Farcta	
Urtica Dioica * Humic acid	0	60.41 d	63.03 d	63.05 d		
	150	66.95 c	67.68 c	69.02 c		
	300	73.90 b	75.75 ab	77.79 a		
Prosopis Farcta * Humic acid	0	62.75 e	66.28 d	66.42 d	0	65.15 C
	150	67.02 cd	68.25 b-d	70.02 a-c	150	68.43 B
	300	71.48 ab	71.93 a	73.42 a	300	72.28 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level

Total yield (Kg/tree)

Results in Table 5 illustrated that foliar spray of Urtica Dioica at 300 mg L^{-1}, Prosopis Farcta at 300 mg L^{-1} recorded the highest value of total yield 12.33, and 12.13 Kg/tree correspondingly in comparison to other treatments, however, the various humic acid spraying treatments don't differ much from one another. Concerning the influence of interaction among Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acid, there was a significant effect on total yield, the maximum values 12.48, 12.50 and 12.42 Kg/tree respectively, was obtained when fig trees were treated with 300 mg L^{-1} Urtica Dioica + 150 mg L^{-1} Prosopis Farcta, 300 mg L^{-1} Urtica Dioica +0 mg L^{-1} Humic acid and 300 mg.L^{-1} Prosopis Farcta + 150 mg L^{-1} Humic acid. Results of Urtica Dioica, Prosopis Farcta and Humic acid interaction, indicated that, the interaction among 300 mg L^{-1} Urtica Dioica + 150 mg L^{-1} Prosopis Farcta + 0 mg L^{-1} Humic acid produced the highest chlorophyll content 12.83 Kg/tree, it was the most effective treatment, while the interaction, among 0 mg L^{-1} Urtica Dioica + 0 mg L^{-1} Prosopis

Farcta + 0 mg L^{-1} Humic acid (control treatment) produced the lowest value 9.99 Kg/tree.

Table 5. Effects of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on Total yield (Kg/tree) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	9.99 g	10.73 fg	11.27 c-f	10.66 d	11.24 B
	150	11.54 b-f	11.56 b-f	11.02 ef	11.38 c	
	300	11.18 d-f	12.31 ab	11.54 b-f	11.68 bc	
150	0	12.37 ab	12.39 ab	12.12 a-d	12.30 a	12.31 A
	150	12.10 a-d	12.23 a-c	12.59 a	12.31 a	
	300	12.28 ab	12.75 a	11.95 a-e	12.32 a	
300	0	12.36 ab	12.43 ab	11.57 b-f	12.12 ab	12.33 A
	150	12.83 a	12.23 a-c	12.37 ab	12.48 a	
	300	12.30 ab	12.21 a-c	12.69 a	12.40 a	
Humic acid		11.88 A	12.09 A	11.90 A	Prosopis Farcta	
Urtica Dioica* Humic acid	0	10.90 c	11.53 b	11.28 bc		
	150	12.25 a	12.46 a	12.22 a		
	300	12.50 a	12.29 a	12.21 a		
Prosopis Farcta * Humic acid	0	11.57 c	11.85 bc	11.65 bc	0	11.69 B
	150	12.16 ab	12.01 a-c	12.00 a-c	150	12.05 A
	300	11.92 a-c	12.42 a	12.06 a-c	300	12.13 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

Total Soluble Solids (TSS %)

Table 6 indicated that increasing levels of Urtica Dioica, Prosopis Farcta and Humic acid significantly, increased TSS, the highest value 21.49, 21.09 and 20.35 % were obtained from 300 mg L^{-1} Urtica Dioica, 300 mg L^{-1} Prosopis Farcta and 300 mg L^{-1} Humic acid. Concerning the interaction of Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acid, also Table 4 clearly shows that the highest TSS was 22.67, 21.96 and 21.29 % resulted of interaction of 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta, 300 mg L^{-1} Urtica Dioica + 150 mg L^{-1} Humic acid and 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid respectively. Concerning the interaction between three studied factors (Urtica Dioica, Prosopis Farcta and Humic acid), the combination effect of 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid gave the highest TSS value 22.83 %.

Table 6. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on TSS (%) of fig trees

Urtica Dioica (mg L^{-1})	Prosopis Farcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	17.90 kl	15.17 m	17.17 l	16.74 f	18.09 C
	150	15.17 m	19.03 h-k	20.47 e-h	18.22 e	
	300	18.83 i-k	18.93 i-k	20.17 f-i	19.31 d	
150	0	20.53 e-h	19.20 h-k	21.50 a-f	20.41 c	19.94 B
	150	17.83 kl	18.03 j-l	18.50 j-l	18.12 e	
	300	21.97 a-e	21.00 c-f	20.87d-g	21.28 b	
300	0	19.27 h-k	21.27 b-f	19.50 g-j	20.01 cd	21.49 A
	150	21.27 b-f	21.93 a-e	22.17 a-d	21.79 b	
	300	22.50 a-c	22.67 ab	22.83 a	22.67 a	
Humic acid		19.47 B	19.69 B	20.35 A	Prosopis Farcta	
Urtica Dioica * Humic acid	0	17.30 g	17.71 g	19.27f		
	150	20.11 de	19.41 ef	20.29		
	300	21.01 bc	21.96 a	21.50 ab		
Prosopis Farcta* Humic acid	0	19.23 de	18.54 ef	19.39 d	0	19.06 B
	150	18.09 f	19.67 cd	20.38 bc	150	19.38 B
	300	21.10 ab	20.87 ab	21.29 a	300	21.09 A

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

Total acidity (%)

Table 7 explained that the foliar spray of Urtica Dioica, Prosopis Farcta and humic acid decreased total acidity, the maximum value was obtained from the control treatment. Concerning the interaction of Urtica Dioica + Prosopis Farcta, Urtica Dioica + Humic acid and Prosopis Farcta + Humic acid, also Table 5 clearly shows that the highest total acidity resulted from the control treatment. In respect to the interaction among Urtica Dioica, Prosopis Farcta and Humic acid, the highest value of total acidity 0.167 % was acquired by combining the following treatments: 150 mg L^{-1} Urtica Dioica + 0 mg L^{-1} Prosopis Farcta + 0 mg L^{-1} Humic acid. Furthermore, the lowest rate was obtained from the interaction of 300 mg L^{-1} Urtica Dioica + 300 mg L^{-1} Prosopis Farcta + 300 mg L^{-1} Humic acid, which was 0.130 %.

Table 7. Effect of Urtica Dioica, Prosopis Farcta and humic acid and their interactions on Total acidity (%) of fig trees

Urtica Dioica (mg L^{-1})	ProsopisFarcta (mg L^{-1})	Humic acid (mg L^{-1})			Urtica Dioica * Prosopis Farcta	Urtica Dioica
		0	200	300		
0	0	0.159 ab	0.154 bc	0.154 bc	0.156 a	0.152 A
	150	0.150 b-e	0.150 b-e	0.149 b-e	0.150 b-a	
	300	0.151 b-e	0.149 b-e	0.152 b-d	0.151 a-c	
150	0	0.167 a	0.147 c-f	0.148 c-f	0.154 ab	0.149 B

	150	0.147 c-f	0.145 c-g	0.146 c-g	0.146 c-e	
	300	0.143 d-g	0.146 c-g	0.147 c-f	0.145 de	
300	0	0.140 e-h	0.142 d-g	0.142 d-g	0.141 ef	0.137 C
	150	0.137 f-i	0.136 g-i	0.137 f-i	0.137 fg	
	300	0.141 d-h	0.132 hi	0.130 i	0.134 g	
Humic acid		0.148 A	0.145 B	0.145 B	Prosopis Farcta	
Urtica Dioica * Humic acid	0	0.153 a	0.151 a-c	0.152 ab		
	150	0.152 ab	0.146 b-c	0.147 b-c		
	300	0.139 d	0.137 d	0.136 d		
Prosopis Farcta * Humic acid	0	0.156 a	0.148 b	0.148 b	0	0.150 A
	150	0.145 b	0.144 b	0.144 b	150	0.144 B
	300	0.145 b	0.142 b	0.143 b	300	0.143 B

- Means within a column, row and their interaction following with the same letter are not significantly different according to Duncan's multiple range test at the probability of 0.05 level.

According to the results, spraying treatments had beneficial effects on most of the parameters under this study, (total chlorophyll content, leaf area, leaves carbohydrate, TSS, fruit weight and total yield), Urtica Dioica contains vitamins, calcium, iron, and carbohydrates, which may explain its great impact on fig trees. The foliar application of botanical extracts from Nettle has good effects on plant growth, development and enhances trees nutrient content due to its auxin content (Otles and Yalcin. 2012; Langa-Lomba, *et al*., 2021). Nettle (*Urtica dioica* L.) extracts, containing substances that promote natural processes that enhance plant growth, improve nutrient uptake, improve plant resistance to stress, positively affect their primary and secondary metabolism, and modify physiological processes, as well as their yield (Kaberia, 2007). It is rich in boron, Sulphur, calcium, phosphorus, nitrogen, phenolic compounds, antioxidants and chlorophyll, Additionally, nettle extract stimulates the uptake of nitrogen (Zeipiņa, *et al*., 2014). Many studies have also noted that Prosopis Farcta may have a positive impact due to its protein-rich nature. Total proteins are crucial for the transportation of vitamins, hormones, and enzymes. (Lajnef, *et al*., 2015). Also the positive impact of spraying Prosopis Farcta extract may be due to the role of its essential elements such as photosynthesis reactions, DNA metabolism, and protein and carbohydrate biosynthesis due to increased mineral content in leaves (Harzallah-Skhiri, *et al*., 2004). This result was in agreement with those (Pasiecznik *et al*., 2004; Rutto *et al*., 2013 and Mayi *et al*., 2021). The effects of humic substances on plant growth are explained by morphological, physiological, and biochemical effects, therefore foliar application of humic acid had a positive effect on the vegetative and flowering growth traits of fig trees (Nardi *et al.*, 2007). The positive effect of humic acid in this study might be explained that humic acid enhanced cell permeability, which in turn made more rapid entry of minerals and higher uptake of plant nutrients and subsequently the photosynthetic efficiency. These results agree with the findings of (Fathy *et al*., 2010; Tahira *et al*., 2013) Humic acid foliar application increased the yield and Fruit quality, and chemical characteristics of fig trees. These results were in agreement with data reported by (Shaddad *et al*., 2005; Eissa *et al*., 2007; Ferrara and Brunetti, 2010).

Conclusions

Based on the results of this study it was found that foliar spray with Urtica Dioica and Prosopis Farcta especially at 300 mg L^{-1} led to, a significant increase in mostly studied characteristics (leaf area, leaves carbohydrate, fruit weight, total yield, TSS) compared with control except total acidity So according to the obtained results it is highly recommended to use the Urtica Dioica and Prosopis farcta with other fruit trees or other plants due to its positive effect on growth and it doesn't lead to contaminate the environment. According to the results obtained in this study the humic acid had a promoting effect on the vegetative growth of fig trees also it had an active role in yield characteristics as compared with the control. Additionally, there was a significant rise in the binary and triple interactions of the study treatments on all the traits examined, particularly at high study factor levels.

Conflict of Interest

The authors state that there are no conflicts of interest with the publication of this work.

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