Effect of Foliar Application of Humic Acid and The element, Boron and Zinc in The Components of The Olive Leaves (khodeiry variety)

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ABSTRACT

The experiment was carried out during seasons 2017, 2018,2019 on olive orchard in Alkhalof affiliate to Lattakia Governorate on khodeiry variety on 30 years old, with the aim studying the effect of foliar spraying with boron, zinc and humic acid on components of olive Leaves. These nutrients were sprayed singly or incombination on olive trees three times during the growing season ; before flowering, after fruit setting and after 25 days from second spray. The results of the statistical analysis showed a clear effect of the foliar application operations with the studied elements (humic acid, boron, and zinc) either when spraying individually or as a mixture in the components of olive leaves, and the effect varied between the on years and of years, while control achieved the lowest values in most of the components.

Keywords: *foliar application, Humic acid, Boron, Zinc, leaves components.*

I. INTRODUCTION

Olive belongs to Oleaceae, genus Olea, it wildly grows in most regions of the Mediterranean Basin where The Levant is considered its native habitat [1] and the cradle of its spread. Olive is considered a renewable natural source and a Strategic agricultural option for a great part of the agricultural lands in Syria . It provides an essential nutritional elements in addition to its role in providing employment and the industrial inputs as well as contributing to importing. Olive benefits are not limited to its fruits but its wood is used for heating. Also, its leaves have a great nutritional and medical importance, where one olive tree produces a 25 KG of leaves in one season and that could be freshly used in ruminant diets and as a powder in the poultry fodder or crushed to feed rabbits [2]. These leaves have various biological efficacies as an efficient antioxidant [3] [4], to reduce both of sugar and blood pressure , prevent pain and intestinal cramps as well as an anti-microbial activity especially the widespread Bacteria and Fungi [5]. At the present time The extract of the olive leaves is used in the human food in various forms, dried as tea leave and that confirm the positive role of the olive leaves in addition to their role in photosynthesis and synthesizing The necessary carbohydrate and Protein for the continuation of growth and production. Due to the previously mentioned positive merits of the olive leaves, the effect of the foliar feeding and its components should be recognized.

Absorption of mineral elements is more efficient and faster in leaves comparing to roots especially in the suitable conditions of the soil such as high value of soil PH and Calcareous soils [6]. Many researchers confirmed the importance of the foliar feeding for overcoming the soil problems as well as facilitating the mineral elements to reach to leaves which improves the nutritional status of the tree and increases the production as well as its quality ([7], [8]).

Boron has an important role in the plant growth, and its productivity in addition to fruits quality due to the Physiological role of that element in managing hormones amount such as auxins and some antioxidant material as the phenols where these compounds considered essential for the plant growth [9]. Experiments of [10] presented that the lack of Boron considered one of the reasons of the fruits fall as it helps in transferring carbohydrate and synthesizing the hormone Indol Actic Acid.

Adding Zinc to the trees improves fruits quality and affects the activity of Nitrogen and the Carbohydrate movement from the branches to the storage members (fruits). Also, Zinc has a major role in the chlorophyll , protein and DNA in addition to its influence in the Photosynthesis due to changing the Chloroplast and the systems of transferring the Photosynthesis electron as well as CO2 fixation. As a result, Zinc increases the fruits weight influenced by Photosynthesis Enzymes [11]. [12] proved that the foliar spry with a mixture of seaweed, nitrogen and boron resulted in improving the vegetative growth, the general nutritional status of the trees, the Productivity and the oil quality. Humic substances (Humic acid. Fulvic acid) are considered of the main components of the fertile soil (65-70%) and highly responsible for the increase in the plant growth due to the increase in the Cellular membrane permeability, breath, photosynthesis and phosphorous absorption [13].

Re. [14] found that applying Humic acid with two concentrations (1 and 2 ml/L) and land fertilizing by an average of (5 and 10 ml/L) increased the carbohydrate percentage in the branches of the peach trees and improved the leaves content of chlorophyll and NPK. [15] presented that soil_and foliar fertilizing_for apple trees with Humic acid increased the dry substance of the vegetative system and the root system capacity for absorbing the minerals from the soil and improved the photosynthesis because of the Humic acid role in increasing the leaves content of total chlorophyll [16]. Re. [17] recorded that applying three levels of Humic acid (0, 1 and 2 ml/L) with a concentration of 12% on *Eriobotrya* seedlings (*Eriobotrya japonica L.),* improved the most of growth qualities (Leaves number, leaf area, fresh and dry weight of leaves). Results of the experiments conducted by [18] aiming at recognizing the effect of Humic acid on growth and productivity of Peach, showed that adding Humic acid to the soil with concentration of 0.5 % and spray of humic acid with concentration of 0.5 %, led to an increase in the leaves content of chlorophyll, Nitrogen , Phosphorous and Potassium.

The importance of the research comes in studying the effect of leaf application with humic acid, boron and zinc, independently or in the form of a mixture in the components of olive leaves and the effect of (on year) and (of year) on it.

II. MATERIALS AND METHODS:

A - Plant material:

The study conducted during three growing seasons 2017, 2018 and 2019 on olive trees, khodeiry variety, 30 years in the Alkalouf of Lattakia Governorate that planted at a distance of 10*10 m.

B- Analysis of research site soil:

Analysis on soil samples of the study site was conducted at a depth of : 0-30 cm and 30-60 cm.

Table (1) characteristics of research site soil before foliar application

Chemical traits											Mechanical analysis			
									suspension					
Effective calciu	total calcium carbonate	Boron Content	Iron content	Zinc content	K available content	P available content	N mineral content	Organic material	Ec melimos CM^3	Ph	Silt %	Sand %	Clay %	Depth cm
27.55	**55.2**	**2.05**	**3.97**	**0.89**	**122**	**18**	**13**	**1.86**	**0.44**	**7.53**	**30**	**23**	**47**	**0-30**
29.14	**58.4**	**1.99**	**2.85**	**0.74**	**194**	**14**	**12**	**1.86**	**0.33**	**7.52**	**24**	**21**	**55**	**30-60**

Results show that soil has a clay and loamy structure, Moderate alkalinity, non- saline, deficient in nitrogen, an acceptable content of potasium and rich in phosphorous. Also, it is a calcareous soil, rich in total and effective calcium carbonate and an adequate content of the organic substance as well as a good content of Zinc and Iron also rich in boron.

calcareous soils that are rich in calcium carbonate are considered of the most important type of soils that spread in Syria and causes many nutrition problems, where these soils have an important role in the difficulty absorbing microelements and phosphorous despite that they are available in adequate amounts through transforming elements and compounds that cannot be absorbed by the plant where they are fixated as Carbons, Oxides and Hydroxides.

C- Design of the experiment:

The experiment was designed using the complete random block method, where the experiment treatment number was 12 treatments, each one consists of (4) replicates, each one consists of one tree, so the number of experiment trees is 48 trees.

Treatments were as the following:
following :

T1: control without application

T2: applying Zinc with a concentration of 75 ppm

T3: Applying Boron 200 ppm

T4: Applying Boron 200ppm and Zinc with a concentration of 75 ppm

T5: Applying Humic acid with a concentration 250 ppm

T6: Applying Humic acid with a concentration 250 ppm and Zinc at a concentration 75 ppm

T7: Applying Humic acid at a concentration 250 ppm and Boron with a concentration 200 ppm .

T8: Applying Humic acid at a concentration 250 ppm and Boron at a concentration 200 ppm and Zinc with a concentration of 75 ppm.

T9: Applying Humic acid at a concentration 500 ppm.

T10: Applying Humic acid at a concentration 500 ppm and Zinc at a concentration 75 ppm .

T11: Applying Humic acid at a concentration 500 ppm and Boron at a concentration 200 ppm.

T12: Applying Humic acid at a concentration 500 ppm , Boron at a concentration 200 ppm and Zinc at a concentration 75 ppm .

The experiment was conducted during three periods :First period, at the outset of bulging the axillary bud of leaves (flower bud).

Second period: two weeks after the set .

Third period: 25 days after the second application .

D- ***studied parameters***:

1- Estimating the total chlorophyll in the leaves : it was estimated by using the devise Spectrophotometer according the equation:

Chlo=6.4*(OD 663)+18.8*(OD 644)

OD: represents optical density in an optical wave at a length of 663 and 644 millimicron.

2- Estimating the carbohydrate percentage in leaves:

carbohydrate %=100- (moisture +protein +ash +fat+ fibers).

3- Estimating Protein Percentage in leaves: The total Nitrogen was estimated according to [19] and multiply the total by protein coefficient 6.25 .

4- Dry matter percentage: The percentage of the dry matter of leaves was calculated by estimating it using the stable weight method and that by drying the leaves with the drier at a temperature of 105 m°.

$$\text{Dry matter percentage} = \frac{\text{dry weight}}{\text{Fresh weight}} \times 100$$

5- Estimating the fibers in leaves: Percentage of fibers in leaves in the dry plant samples were estimated according to [19].

6- Estimating the fat percentage in leaves: The percentage of the fat in leaves in the dry plant samples were estimated according to [19] .

The leaves were taken from the middle of a one-year-old branch in mid of July.

Data Analysis:

The results were statistically analyzed using the Genstat 7 computer program, and the Duncan test was used at the 0.05 level.

III. RESULTS AND DISCUSSION

A- Effect of foliar application on the total chlorophyll content:

Table (2) indicates that foliar application with Humic acid, Boron and Zinc, independently or as a mixture on the khodeiry variety, led to a noticeable increase in the leaves content of chlorophyll comparing to the control, where the highest average of total chlorophyll recorded in the fourth treatment T4 (application with Boron and Zinc) (1.03 mg/g) followed by the sixth treatment T6 (Humic 250ppm and Zinc 75 ppm) (0.94 mg/g) and the lowest was in the control treatment T1 (0.69 mg/g) for the first season 2017 which is the on year While leaves content of chlorophyll increased in the second season 2018 off year where the highest amount of total chlorophyll was in the second treatment T2, application with Zinc (1.32 mg/g) and the fourth treatment (application with boron and Zinc) T4 (1.31 mg/g) followed by the twelfth treatment T12 (application with Humic m Boron and Zinc) (1.22 mg/g) and the lowest was in the control treatment 0,87 mg /g.

While the third season 2019 (on year), a positive improvement in the chlorophyll content was observed in all studied treatments where treatment T12 recorded (2.06 mg/g), T11 (2.06 mg /g) and the highest content was in T 7 (2,04 mg/g) which significantly outperformed the other treatments followed by T10 (1.97 mg/g) and the lowest was in the control treatment T1 (1.33 mg/g).

Through studying the Table (2), we found that the past differences among the treatments during growing season explain the positive role f the foliar application with Humic, Boron and Zinc in increasing the total chlorophyll amount and therefore an increase in the photosynthesis then an increase in nutritional reserves which positively reflects on the increase in growth and production . this increase is due to the Boron role in synthesizing Carbohydrate, Protein and chlorophyll [20]. Also, Zinc increases needed energy source to produce chlorophyll [21] which is consistent with [22] where they found that the foliar application with Boric, Zinc Sulfate and Iron chelates recorded the highest average of relative chlorophyll in olive leaves of "Nebalymohasan" variety. Re. [23] found that Humic acid increases the permeability of the cellular membranes and absorption of nutrients which contribute to the increase in photosynthesis and generation of carbohydrate and protein. Also, [24] referred to the role of humic as an influencing factor in iron acquisition by plants which positively reflects on chlorophyll. This is consistent with [14] who reported that Humic decreased water potential and Proline and increased chlorophyll content of the seedlings of Pyrus pyrifolia and that consistent with the results of [25] which show that applying Humic acid on grape bushes led to an increase the leaves content of chlorophyll.

The increase chlorophyll of leaf is related to the increase in Fe, Mg and N in the leaves. These elements have a main role in the chlorophyll structure [26]. Also, [27] reported that chlorophyll connected to Nitrogen where the optical proteins contain more than the half of the leaf Nitrogen .

Table(2): Effect of foliar application on leaves content of total chlorophyll (khodeiry variety)

Total chlorophyll amount mg/g			treatment	
2019	**2018**	**2017**		
1.33f	**0.87d**	**0.69 e**	Control	**T1**
1.42ef	**1.32a**	**0.72de**	Zn 75 ppm	**T2**
1.89abc	**1.12abc**	**0.76cde**	B 200 ppm	**T3**
1.75bcd	**1.31a**	**1.03a**	(Zn 75 ppm+ B 200 ppm)	**T4**
1.82abcd	**1.15abc**	**0.81cd**	Humic 250 ppm	**T5**
1.61de	**1.07bcd**	**0.94ab**	(Humic250 ppm +Zn 75 ppm)	**T6**
2.04a	**0.99bcd**	**0.85bc**	(Humic 250ppm +B 200 ppm)	**T7**
1.86abc	**0.93cd**	**0.82cd**	(Humic 250 ppm +Zn 75 ppm+ B 200 ppm)	**T8**
1.72cd	**1.06bcd**	**0.86bc**	Humic 500pmm	**T9**
1.97ab	**1.08abcd**	**0.81cd**	(Humic 500 ppm + Zn 75 ppm)	**T10**
2.06a	**1.09abcd**	**0.81cd**	(Humic 500 ppm + B 200 ppm)	**T11**
2.06a	**1.22ab**	**0.84bc**	(Humic 500 ppm+ Zn 75 ppm + B 200 ppm)	**T12**

*There are no significant differences among the common values of the same values at the same column

B- Effect of Foliar Application on leaves content of Carbohydrate and Protein:

Carbohydrate: Statistical analysis of table (3) figures indicated the superiority of the treatment of foliar application with Humic T9 in the olive leaves content of carbohydrate for the first season 2017 (on year) at a rate of 35.63 % and the lowest was in the treatment T3 at a rate of 26.10 %. In the second season (off year) T6 was superior by where the rate recorded 33.53 % and the lowest was in T7 at a rate of 21.81 %. While in the season of 2019 (on year) and as a result of repeating the foliar spraying, treatments T9, T8, T7 ,and T6 were significantly superior followed by T4 at a rate of 37.44 % and the lowest was in the control treatment 33.32%. Re. [28] reported that foliar application with 10 ml/L of Humic acid on olive seedlings" Shami" recorded an increase in leaves content of carbohydrate 89.61 mg/L comparing to the control 85.32 mg/L. Re. [29] indicated in a study of the effect of the foliar spraying with Zinc and Boron on three varieties of olive (Mission, Coronaiki, Keylet) that the percentage of carbohydrate varies according to the varieties, also the leaves content differs from that in the fruits and the more the color of the fruits changes the more the carbohydrate they content, and the fewer in the leaves. She found that Zinc Sulfate greatly enhanced the content of carbohydrate in olive varieties comparing to the other nutrients. The positive effect could be due to Zinc Sulfate in the contents of total carbohydrate resulted from its important role in the main Enzymes of the carbohydrates metabolism [30]. Re. [31] reported that soluble carbohydrates in olive during the fruits ripening over the years, dissolved sugars increased for a period up to 90 days after the fruit set and decreased during the fruit ripening. Also, Mantinol, glucose and fructose are the main components of soluble sugars and the leave content of carbohydrate varies according to the variety and the on year and the off year.

Table (3) Effect of foliar application on leaves content of carbohydrate (khodeiry variety)

Leaves content of carbohydrate %			treatment	
2019	2018	2017		
g 33.32	d 26.00	bc 29.38	Control	T1
bc 36.74	ab 32.47	abc 30.46	Zn 75 ppm	T2
de 35.60	bcd 29.08	c 26.10	B 200 ppm	T3
ab 37.44	cd 28.50	bc 27.05	(Zn 75 ppm+ B 200 ppm)	T4
cd 36.41	abc 31.46	ab 32.21	Humic 250 ppm	T5
a 38.17	a 33.53	ab 31.59	(Humic250 ppm +Zn 75 ppm)	T6
a 37.77	e 21.81	abc 30.99	(Humic 250ppm +B 200 ppm)	T7
a 37.97	abc 30.39	bc 30.15	(Humic 250 ppm +Zn 75 ppm+ B 200 ppm)	T8
a 38.09	abc 31.50	a 35.63	Humic 500pmm	T9
g 33.51	abcd 29.75	abc 30.44	(Humic 500 ppm + Zn 75 ppm)	T10
ef 35.09	bcd 28.65	abc 30.63	(Humic 500 ppm + B 200 ppm)	T11
f 34.50	abc 31.51	bc 28.21	(Humic 500 ppm+ Zn 75 ppm + B 200 ppm)	T12

* There are no significant differences among the common values of the same values at the same column

Proteins: Results of Table (4) presented that treatment T3 surpassed other treatments in the leaves content of Protein 12.43 %, followed by treatment T4 at the rate of 10.5 % for the first season. In season 2018, treatment T3 surpassed other treatments with the highest percentage of Protein in leaves 12 .55 % followed by treatment T4 at a rate of 9.86 % and the lowest was recorded in treatment T2 at a rate of 5.51 %. While in the season of 2019 (on year), as a result of the vegetative growth and Production, superiority of the control treatment was observed at a rate of 11.57 % followed by treatment T12 at a rate of 9.04 % and the lowest was recorded in treatment T7 at rate of 5.94 %. The control treatment superiority could be due to that the treatments during the research years, did best in the vegetative growth, production improvement and compensating the required trees of nutrients, while the control treatment remained the lowest in production and traits of vegetative growth. Boron Facilitates the transition of sugars to the fruits by synthesizing complex sugar and Borate where its transition through the cellular membranes is easier than the transition of sugar molecule alone. But the most important role of Boron presented in synthesizing **Monosaccharides** as well as organizing the work of some Enzymes and auxins [32], [33] [34].

Zinc has a role in the photosynthesis as it is a factor in synthesizing the chlorophyll molecule therefore increasing the synthesized matters_(carbohydrates and Proteins) which results in an increase in Potassium absorption by the roots [35]. Boron participates in synthesizing carbohydrate, Proteins and Chlorophyll [20]. Re. [36] recorded that low concentration of Humic acid improves plant growth and increases production through its influence on the mechanism of many important bioprocesses in the plant such as breath, photosynthesis, Protein synthesis, absorption of water and nutrients in addition to the increase in Enzymes activity. Re. [37] indicated that olive leaves content of Proteins in production year is higher than in the (off year) and on the contrary in the trees bark .

Table (4): Effect of foliar application on the olive leaves content of Protein (khodeiry variety)

Leaves content of Protein %			**Treatment**	
2019	2018	2017		
a 11.57	de 7.92	d 8.12	Control	**T1**
cd 7.91	h 5.51	e 6.8	Zn 75 ppm	**T2**
bc 8.6	a 12.55	a 12.43	B 200 ppm	**T3**
de 7.76	b 9.86	b 10.5	(Zn 75 ppm+ B 200 ppm)	**T4**
bcd 8.47	fg 6.74	e 7.21	Humic 250 ppm	**T5**
bc 8.54	b 9.46	bc 9.66	(Humic250 ppm +Zn 75 ppm)	**T6**
g 5.94	cd 8.64	c 9.54	(Humic 250ppm +B 200 ppm)	**T7**
f 6.85	bc 9.09	bc 9.69	(Humic 250 ppm +Zn 75 ppm+ B 200 ppm)	**T8**
ef 7.15	ef 7.32	e 7.01	Humic 500pmm	**T9**
f 6.78	g 6.39	e 6.69	(Humic 500 ppm + Zn 75 ppm)	**T10**
cd 7.96	ef 7.29	e 7.28	(Humic 500 ppm + B 200 ppm)	**T11**
b 9.04	bc 9.4	c 9.16	(Humic 500 ppm+ Zn 75 ppm + B 200 ppm)	**T12**

* There are no significant differences among the common values of the same values at the same column.

C- Effect of foliar application on the leaves content of the dry matter, fibers and fat :

Dry matter: Results of table (5) indicate that leaves content of the dry matter varies between the (on years) and the (off years) where results of the statistical analyses showed no significant differences in 2017 even though a little increase was observed in the treatments with high concentration of Humic acid 500 ppm with both elements (Zn, B). In season 2018, T4 surpassed the other treatments at a rate of 55.68 % and the lowest was in T6 at a rate of 49.37 % which is the (off year). In season 2019, T3 surpassed the other treatments at a rate of 55.20 %, while the lowest was in T8 at a rate of 51.62 % and T11 at 51.41 %. Percentage of the dry matter of leaves is due to the role of Humic acid, Boron and Zinc in the increase of the leaf area and their content of Chlorophyll, which positively reflected on the leaves efficiency through their role in photosynthesis and its positive effect on producing synthesized matter which are mostly Carbohydrates, Nitrogenous compounds such as Amino and nucleic acids and therefore an increase in the dry matter. Also, Boron enhances the cells division and synthesizing the Amino and nucleic acids in addition to contributing to synthesizing cellular membranes [38] [39], increasing cells number in the leaves and their content of synthesized and stored synthesizes matter in it, and therefore an increase in the dry matter percentage. The difference years of the study is due to the effect of growth and production on the content of the dry matter .

Re. [40] recorded that the decrease in the dry matter percentage when applying Humic acid is due to its content of organic compounds and mineral elements particularly Potassium which effectively participate in many of the Physiological processes as organizing the work of stomata where its accumulation in the guard cells affect the osmotic pressure. Therefore, with sugars are considered as the driving force for opening and closing stomata. This process directly affect the water relations inside the plant as absorbing water and nutrients from the soil in addition to the Humic acid role in the increase in the water content of the plant [41].

Fibers: Results of table (5) presents indicate that the highest content of fibers in leaves during the season of 2017 was in the treatments T2 and T4 at a rate of (30.21, 30.39 %) respectively, and the lowest was in the treatments T12, T7 and T11 at a rate of (25.34, 25.05, 25.02 %) respectively. While in the season (off year) (2018) Treatment T10 significantly surpassed the other treatments in terms of leaves content of fibers at a rate of 27.63 % and the lowest was in the treatment T3 (20.21) %. In season 2019 (on year) a decrease in the leaves content of fibers was observed comparing to the season 2017 where Control treatment T1 recorded the highest rate (24.72)% and T8 the rate (24.48)% and the lowest was in the treatment T4 at a rate of 19.92 % .

Re. [2] reported that percentage of raw fibers was up to 16.24 % and that in a study of possibility of using olive leaves as alterative fodder. Also, [42] indicated that olive leaves are a rich source in raw fibers and mineral elements.

Fat:

Re. [43] indicated that there are several studies on the Phenolic composition of olive leaves and few on synthesizing Amino acids, which are plant chemicals that could be used as nutrients and their composition varies as olive varieties. [44] chemical analysis of olive leaves indicated that they are poor in Nitrogen and rich in raw fat , acid fibers as well as low tannins. The two treatments T12 and T11 recorded the highest rate of fat in leaves 25.76 and 25.72 % respectively, table (5), While the lowest value of fat in leaves was in treatment T2 (21.13 %) in 2017 and in the season of 2018 (off year) the leaves content of fat increased because of the alternate bearing and the low fruit production thus the fat matter recorded a high concentration in leaves, so treatment T7 recorded (32.36%) and treatment T5 (30.88 %) which are the highest percentages of fat in leaves while the lowest recorded in treatment T12 (24.34%) and T9 (23.25 %). while in the season of 2019 (on year) treatment T10 recorded the highest percentage by (32.05%) and the lowest in was in the control at a rate of (23.53 %) .

Variance in the leaves content of fat is due to the difference between the (on year) and the (off year). In the on years most of the nutrients leave the leaves to the fruits, while they stay in the leaves in the (off years) because of the low production of fruits . Also, the date of taking leaf samples could be a factor that affect the increase in the fat percentage if it is taken in July. [45] [46] indicated that the chemical analysis of olive leaves varies according to the origin, the branches ratio on the tree, storing conditions, climate conditions and content of moisture. [47] [48] also mentioned the effect of foliar spray with humic, boron and zinc acid on the growth of olive trees, and to the role of these elements in influencing production in the production year and alternate year.

Table (5): Effect of foliar application on the olive leaves of (khodeiry variety) of dry matter, fibers and fat

Leaves content of fat %			Leaves content of fibers %			Leaves content of dry matter %			Treatment	
2019	2018	2017	2019	2018	2017	2019	2018	2017		
23.53 g	30.66 ab	23.27 ab	24.76 a	24.36 f	27.81 bc	54.83 ab	50.8 ab	54.06 a	control	T1
26.62 d	30.13 abc	21.13 b	22.53 bc	21.68 g	30.21a	54.13 abc	52.53 ab	54.24 a	Zn 75 ppm	T2
27.90 bc	27.55 cde	21.73 b	21.08 de	20.21 j	28.65 ab	55.20 a	51.05 ab	54.72 a	B 200 ppm	T3
28.49 b	30.59 ab	21.52 b	19.92 f	20.74 i	30.39a	53.84 abc	55.68 a	53.90 a	(Zn 75 ppm+ B 200 ppm)	T4
27.73 bc	30.88a	23.40 ab	20.47 ef	20.57 i	26.45 bcd	53.28 abc	52.08 ab	53.39 a	Humic 250 ppm	T5
24.54 f	25.59 def	22.32 ab	22.98 b	21.05 h	25.63 cd	54.90 ab	49.37 b	54.79 a	(Humic 250 ppm +Zn 75 ppm)	T6
27.62 c	32.36a	23.29 ab	21.26 d	26.66 c	25.05d	52.01 abc	52.86 ab	54.77 a	(Humic 250ppm+ B 200 ppm)	T7
25.48 e	24.62 ef	23.27 ab	24.48 a	24.69 e	26.99 bcd	51.62 bc	52.03 ab	54.84 a	(Humic250ppm+ Zn 75 ppm+B 200 ppm)	T8
27.52 c	23.25f	21.49 b	20.01 f	27.33 b	27.21 bcd	54.19 abc	51.34 ab	54.84 a	Humic 500 ppm	T9
32.05 a	25.67 def	24.23 ab	22.73 bc	27.63 a	27.89 bc	54.87 ab	53.08 ab	55.73 a	(Humic500 ppm+Zn 75 ppm)	T10
28.12 bc	27.72 bcd	25.72 a	21.31 d	26.28 d	25.02 d	51.41c	51.66 ab	56.63 a	(Humic 500 ppm+ B 200 ppm)	T11
27.83 bc	24.34f	25.76 a	22.01 c	24.82 e	25.34 d	53.62 abc	52.46 ab	55.13 a	(Humic 500 ppm+Zn 75 ppm + B 200 ppm)	T12

*There are no significant differences among the common values of the same values at the same column

Through our study, it was found that foliar feeding with microelements, Zinc, Boron, and Humic acid contributed to improving the carbohydrate rate whether when applying them individually or collectively which contributes to limiting the alternate breading, and the decrease of the components percentage was related to the amount of production.

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