RESPONSE OF SOME CHARACTERISTICS OF WHEAT GROWTH TO SPRAYING WITH VITAMIN B9 AND E

H. A. Baqir N. H. Zeboon
Assist. Prof. Prof.
Dep. Field crops-Coll. Agric. Engine. Sci. University of Baghdad
haider.abd@coagri.uobaghdad.edu.iq najat.zeboon@coagri.Uobaghdad.edu.iq

ABSTRACT

Over the course of two winter periods, researchers at the Agricultural Experiment Unit, College of Agricultural Engineering Sciences, University of Baghdad, studied the effects of covering wheat (the Al-Furat variety) and "vitamins B9" ("folic acid") and E "(tocopherol)" on a number of growth traits. Three independent trials were conducted utilizing a factorial design within a Randomized Complete Block Design. The first component was folic acid at 0, 250, and 500 mg L^{-1}; the second component was vitamin E at 0, 1, and 2 ml L^{-1}. At the start of the tillering and flowering stages, both vitamins were applied. All measured characteristics (plant height, flag leaf area, total tiller count, plant dry weight at booting and 100% blooming phases, and "vitamin B9" 500 mg L^{-1}) were found exceeded at this dosage. Aside from that, total chlorophyll, chlorophyll a and b content in leaves, and the pace of crop growth.Since the focus of 2 ml L^{-1} was higher than most of the attributes, applying vitamin E influenced the growth characteristics. The number of tillers, plant dry weight, crop growth rate, total chlorophyll, biological yield, chlorophyll a and b in leaves.

Key words: plant dry weight, tillering, flowering stages, flag leaf area, tocopherol, chlorophyll a and b, total chlorophyll

إستجابة بعض صفات النمو لمحصول الحنطة للرش الورقي بفيتامين B9 وE

حيدر عبد الرزاق باقر نجاة حسين زبون
أستاذ مساعد أستاذ
قسم المحاصيل الحقلية – كلية علوم الهندسة الزراعية – جامعة بغداد

المستخلص

أجريت تجربة زراعية في كلية علوم الهندسة الزراعية، جامعة بغداد تجربة حقلية ولموسمين لدراسة تأثير الرش الورقي بحمض الفوليك والتوكوفيرول على متغيرات النمو المختلفة لمحصول القمح، وتحديداً صنف الفرات. تم استخدام تصميم القطاعات العشوائية الكاملة ثلاثي المكررات (RCBD) لتطبيق التجربة العاملية. تم تضمين مكونات فيتامين E وفيتامين B9 في التجربة بتركيزات مختلفة؛ الأول (0، 1، 2 مل لتر$^{-1}$) والأخير (0، 250، 500 ملجم لتر$^{-1}$). ضع رذاذ فيتامين قبل أن يبدأ النبات في التفرع والازدهار. تفوق فيتامين ب9 بتركيز 500 ملجم لتر$^{-1}$ على التراكيز الأخرى في جميع خصائص النمو والتطور التي تم فحصها، بما في ذلك ارتفاع النبات، ومساحة ورقة العلم، وإجمالي الفروع، والوزن الجاف أثناء البراعم والتزهير، وتأثير معدل نمو المحصول و محتوى ورقة الكلوروفيل أ و ب. كان متوسط تركيز فيتامين E الذي تم رشه أكثر من 2 مل$^{-1}$ لمعظم المعايير، وكانت أعلى القيم ملحوظة في المحصول البيولوجي، عدد الفروع، الوزن الجاف، معدل نمو النبات، الكلوروفيل الكلي، ومحتوى الورقة من الكلوروفيل A وB.

الكلمات المفتاحية: الوزن الجاف للنبات، التفريع، مرحلة التزهير، مساحة ورقة العلم ، كلوروفيل a و b الكلوروفيل الكلي

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INTRODUCTION

Grain from the ancient cereal crop known as wheat (*Treaticum aestivum* L.) includes a wealth of nutrients, including carbs, proteins, minerals, and vitamins; as a result, it feeds almost 35% of the global population. T Horizontal expansion, by increasing farmed areas, or vertical expansion, by using accurate and current agricultural procedures (e.g., antioxidants, growth regulators, and natural extracts) (5, 12, 13, 31, 49) are two strategies to enhance wheat production. Vitamins are chemical molecules that are controlled by biology and are needed in trace amounts to keep plants growing and developing. They are considered co-enzymes that contribute to the regulation of metabolic processes (31). Tocopherol, or vitamin E, is a fat-soluble vitamin that plants primarily store in chloroplasts. In higher plants, it protects and stabilizes the cell membrane (41, 46). Similarly, it controls the second photosystem's electron transport, inhibits lipid oxidation, and plays a regulatory function in maturation and aging (11, 44, 45). In iraq; especially after the significant An upsurge in temperature; many studies focused on spraying the mentioned vitamin and other materials on various strategic crops to alleviate the harmful impact of heat and drought (1, 7, 8, 19, 20, 43). Vitamin B9, also known as folic acid, plays a similar role in amino acid metabolism, controls cell division and elongation, forms nucleic acids, and scavenges free radicals, among its various metabolic pathway roles (6, 9, 16, 28, 42). It improves the creation of porphyrin and chlorophyll in the chloroplast membranes and has a function in photosynthesis by promoting the manufacture of glycine. Given the significance of the aforementioned, the purpose of this study was to determine the effect of covering wheat plants with varying doses of tocopherol and folic acid on their growth characteristics (specifically, the Al-Furat variety).

MATERIALS AND METHODS

Two winters were used to conduct a field experiment at the Field Crops Research Station, College of Agricultural Engineering Sciences, University of Baghdad. The main study aimed was to investigate selected growth characteristics of the wheat plants (Al_Furat variety) applied with vitamins E and B9. The experiment was applied using factorial experiments within RCBD with three replicates. There were two parts to the experimental investigation. One part dealt with vitamin E and had three concentrations (0, 1, and 2 ml L^{-1}), and the other part dealt with folic acid and had three concentrations (0, 250, and 500 mg L^{-1}). With a seeding rate of 120 kg ha-1 and an experimental unit area of (2.5 * 3) m2, 20 cm between the lines, and both factors were covered at the beginning of the tillering stage and the commencement of the flowering stage. (2, 3, 4, 17, 18, 40). Nitrogen was applied in three stages (tillering, elongation, and booting) at a rate of 200 kg ha^{-1}, and phosphate fertilizer in the form of triple superphosphate was provided, fulfilling the experiment's fertilizer requirements (34, 35, 37). Specific measurements were recorded when the plants reached the stage of full flowerings as follows:-

1. The average height of ten plants, measured from the base to the spike of the main stem.The sum of all tillers: Each experimental unit's area, which was 1 m2, was used to compute it.

2.The sq. cm. of the flag leaf: A total of 31 experimental units were used to determine it, with the following equation applied to the normal of 10 main stem ensign trees:

$$\textbf{Flag leaf area} = \textbf{leaf length} \times \textbf{width at the center} \times \textbf{correction factor 0.95}$$

4.Chlorophyll content in leaves: Chlorophyll a, b, and total chlorophyll were estimated by the method of extracting chlorophyll from leaves using 80% acetone, then reading the absorbance of the sample using a spectrophotometer according to wavelengths, and the amount of chlorophyll was estimated according to (29).

1. Dry weight: It was calculated in two stages, the booting stage and the stage of 100% flowering, and for all plants in 1 m^2 of each experimental unit. Thus, the plant roots were cut to the limit of the crown region and excluded, the plants were then placed in paper bags and dried in an electric oven at 65 ° C for 48 hours and after the weight was constant they were weighed with a scale sensitive.

2. The rate of crop growth was determined using the following equation and the time interval between booting and 100% blooming:

$$\mathbf{CGR} = \frac{1}{A}\frac{\mathbf{W2 - W1}}{\mathbf{T2 - T1}}$$

Where:

CGR = "Crop Growth Rate"

A = the area of land occupied by the plant sample

W1 = dry weight of the plant sample at time T1

W2 = dry weight of the plant sample at time T2

3. Biological yield: it was estimated for all plants in the harvested area of each experimental unit at the stage of full maturity.

RESUlTS AND DISCUSSION

Plant height (cm): Table 1 shows that folic acid covering had a substantial influence on plant height across both periods, but that the interface between the two constituents was not statistically important. The plants that were covered with 500 mg L^{-1} of vitamin B9 had the highest average plant heights for the two periods, measuring 87.03 and 89.21 cm, respectively. Plants treated with a 250 mg/L spray, on the other hand, showed no discernible change between the periods. However, the non- covering treatment recorded the lowest averages for this trait, which were 78.76 and 80.43 cm for the two periods, respectively. The reason for the higher meditation of 500 mg L^{-1} exceed in this trait could be attributed to the role of the vitamin B9 in regulating cell division, elongation, and then increasing plant height (22, 42). These results agreed with the findings of (24, 25, 32). Plants covered with 1 ml L^{-1} of the chemical had the tallest average plants, measuring 88.58 cm, while plants covered with 2 ml L^{-1} showed no significant difference. The reason for this could be due to the role of the vitamin E in promoting cell division and expansion (10, 11). These effects are in contract with the outcomes of others (21, 38).

Table 1. Impact of "vitamin B9" and E covering on "wheat plant" height (cm) in two periods

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	72.18	79.44	84.65	78.76
250 mg L^{-1}	83.92	87.95	84.88	83.58
500 mg L^{-1}	86.43	89.39	85.28	87.03
LSD 0.05	NS			5.50
Means	80.84	85.59	84.94	
LSD 0.05	NS			
Folic acid		**Period 2**		Means
0	71.01	83.04	87.25	80.43
250 mg L^{-1}	81.84	90.78	87.28	86.63
500 mg L^{-1}	88.27	91.91	87.45	89.21
LSD 0.05	NS			6.11
Means	80.38	88.58	87.33	
LSD 0.05	6.11			

Flag leaf area (cm^2)

Table 2 shows that there are important changes between the two periods as a result of the impact of folic acid (vitamin B9) covering on expanding the flag leaf area. The highest average flag leaf area was 44.83 and 47.03 cm^2, respectively, for the two periods, which was meaningfully unlike from the rest of the focuss and the 500 mg L-1 of folic acid focus. The reason for these findings could be attributed to the role of the vitamin B9 in stimulating the biosynthesis of glycine, which contributes to the formation of porphyrins and chlorophyll in chloroplast membranes (30, 33). This may have led to an growth in the efficiency of the photosynthesis procedure and an increase in its products, which add to an increase in plant growing represented by the flag leaf area. These outcomes are constant with the judgments of (14, 24, 39, 47). In contrast, the above characteristic was not affected by both covering with tocopherol (vitamin E) and the contact between the two influences for the two periods ,respectively.

Table 2. Impact of “vitamin B9” and E covering on “wheat plant” flag leaf area (cm^2)

Vit B (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	32.32	36.15	39.09	35.85
250 mg. L^{-1}	36.49	38.39	42.22	39.03
500 mg. L^{-1}	44.25	47.91	42.32	44.83
LSD 0.05	NS			4.18
Means	37.69	40.81	41.21	
LSD 0.05	NS			
Folic acid		Period 2		Means
0	32.71	37.59	41.03	37.11
250 mg. L^{-1}	38.56	40.02	44.45	41.01
500 mg. L^{-1}	46.65	49.96	44.47	47.03
LSD 0.05	NS			3.47
Means	39.31	42.52	43.32	
LSD 0.05	NS			

Total number of tillers(m^2)

“Vitamin B9” and E sprays, as well as their interface over the course of two periods, meaningfully increased the plant's total number of tillers, as shown in Table 3. Consequently, the focus of “500 mg L^{-1}” was surpassed by a plant with the top number of tillers, which was 464.42 in the first period and 478.15 in the second. This represents an increase of 42.69% and 38.57%, respectively, and is meaningfully unlike from the other focuss. The reason for an increment is due to the role of folic acid in many of the vital processes taking place in the plant, including the formation of amino and nuclear acids and the free radical scavenging. It was also considered a coenzyme in many metabolic pathways, and perhaps covering it in the tillering stage contributed to improving these activities and then increasing the number of productive tillers, where these outcomes are reliable by (47) conclusions. From the same table, the plants treated by covering with vitamin E with a focus of 2 ml L^{-1} gave the highest average for this trait amounted to 427.77 and 441.77 tiller plant, and did not differed meaningfully from the focus of 1 ml L^{-1}. The reason for this significant effect could be attributed to the fact that covering at the tillering stage protected the chloroplast membranes from light oxidation. Moreover, this effect continued at the flowering stage when the plant was covered at this stage with vitamin E, thus providing ideal conditions for the carbon metabolism process (15). Then increase the products of this process, which contribute to the plant growth, including the increase in the number of tillers and their survival (40). These results are consistent with the findings of other resear chers (21, 38, 45).

The response of the number of tillers differed according to the unlike focuss of folic and when the focuss of vitamin E increased. Similarly, the number of tillers increased with the increase in the focuss of folic spray when the focus of “vitamin E” was increased from zero to 1 ml L^{-1}. In contrast, it decreased inmeaningfully when the focus was enlarged to 2 ml L^{-1} for the first period, while this decreases were significant in the second period.

Table 3. Total number of tillers m2 of wheat plants covered with vitamins B9 and E

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	267.62	337.14	371.65	325.47
250 mg L^{-1}	376.91	384.65	448.97	403.51
500 mg L^{-1}	427.17	503.41	462.68	464.42
LSD 0.05	40.92			23.62
Means	357.23	408.40	427.77	
LSD 0.05	23.62			
Folic acid		Period 2		Means
0	290.64	357.89	385.88	344.80
250 mg L^{-1}	396.84	407.58	463.93	422.78
500 mg L^{-1}	443.95	515.00	475.51	478.15
LSD 0.05	35.14			20.29
Means	377.14	426.83	441.77	
LSD 0.05	20.29			

Dry weight (g m^2)

Table 4 The results show that the plant dry weight varied meaningfully between the two stages of booting and 100% blooming due to the varying effects of covering with “vitamin B9” and “vitamin E”, as well as their contact, for the two periods. During the booting stage, the maximum average dry weight was 951.07 g m2 and during the flowering stage, it was 904.50 g m2 and 1729.38 g m2 correspondingly, surpassing the focus of ‘500 mg’ L-1 of “vitamin B9”. These significant differences could be attributed to the significant effects of this vitamin in growing the plant height (Table 1), the flag leaf area (Table 2) and the total number of tillers (Table 3), which was reflected in the growing dry weight and at the same focus. In general, these findings are consistent with the results of those

(25, 27, 32). As for the influence of vitamin E, the plants covered with a focus of 2 ml/L recorded the highest average for this trait of 849.59 and 809.73 g/m^2 in the booting stage, and 1610.51 and 1590.86 g/m^2 in the 100% flowering stage. The reason for this may be attributed to the fact that covering with vitamin E led to an rise in the flag spray part and the total “number of tillers” (Table 2 and 3), which led to an rise in the plant's dry weight. This result is consistent with the findings of (26, 38). In the same role, the plant's dry weight increased in the booting stage and in the 100% flowering stage by increasing the focuss of folic acid from 0 to 500 mg L^{-1} when increasing the focuss of tocopherol spray from 0 to 1 ml L^{-1}. In contrast, by increasing the focus to 2 ml L^{-1} a decrease in the dry weight was achieved for both two stages and periods, respectively.

Table 4. The impact of “vitamin B9” and E covering on the dry “weight of wheat” plants per square meter

Vit B9 (Folic acid)	Booting stages Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means	Vit B9 (Folic acid)	flowering stages 100% Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1					Period 1		
0	665.16	687.95	751.05	701.39	0	1284.90	1379.64	1498.65	1387.73
250 "mg L^{-1}"	708.48	759.77	841.54	799.93	250 mg. L.$^{-1}$	1460.95	1522.49	1596.72	1526.72
500 mg L^{-1}	893.77	1003.25	956.18	951.07	500. mg. L^{-1}	1661.65	1790.35	1736.14	1729.38
L.SD. 0.05	21.01			12.13	L.SD. 0.05	39.32			22.70
Means	785.80	816.99	849.59		Means	1469.17	1564.16	1610.51	
L.SD. 0.05.	12.13				LS.D. 0.05.	22.70			
Folic acid		Period 2		Means	Folic acid		Period 2		Means
0	618.28	669.24	715.60	667.71	0	1261.76	1411.16	1475.85	1382.92
250 mg L.$^{-1}$	690.34	742.57	822.89	751.93	250 mg L^{-1}	1439.61	1514.59	1608.53	1520.91
500 mg L^{-1}	854.43	968.38	890.69	904.50	500 mg L^{-1}	1645.32	1772.36	1688.19	1701.95
LS.D. 0.05.	20.60			11.89	LS.D. 0.05.	37.88			21.87
Means	721.02	793.40	809.73		Means	1448.89	1566.04	1590.86	
LS.D. 0.05.	11.89				L.SD. 0.05.	21.87			

Crop growing rate (g m^{-2} day^{-1})

Table 5 shows that covering plants with a focus of 500 ml L^{-1} resulted in the highest rate of crop growth, with an average of 11.79 and 12.08 mg m^2 day-1 for the two periods, respectively. This suggests that covering with vitamins B9 and E meaningfully increased the crop growth rate. This is because, at the same dose (500 mg L^{-1}), the plant's dry weight increases during the booting and 100% blooming periods. According to the same data, the plants covered with 1. ml, L-1 of vitamin E showed no significant change in this feature, while the greatest average was reported at 2 ml L^{-1} of “vitamin E”, with values of 11.53 and 11.84 mg m^2 day^{-1}. One possible explanation for the observed increase in crop growth rate when covering with a focus of 2 ml L-1 is that the crop's dry weight increased throughout the booting and 100% blooming periods, which led to a corresponding rise in the rate of crop growth. Furthermore, there was a notable contact between the two components in this feature. It was found that raising the focus of covering “vitamin E” from zero to 2 ml L^{-1} directly increases a crop growth rate when vitamin B9 is not covered. A similar trend was observed when the focus of vitamin E was raised to 1 ml L-1, as was the case when the focus of vitamin B9 was covered at 250 and 500 mg L-1. The next period, when the covering focus was raised to 500 mg L-1 of vitamin B and 1 ml L-1 of vitamin E, this feature began to decline, but it was not statistically significant in the first period.

Table 5. Influence of vitamin B9 and E covering on wheat “crop growth rate” (g m^{-2} day^{-1})

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	9.39	10.48	11.33	10.40
250 mg. L^{-1}	11.40	11.56	11.44	11.47
500 mg. L^{-1}	11.63	11.93	11.82	11.79
LSD. 0.05	0.58			0.33
Means	10.81	11.32	11.53	
LSD. 0.05	0.33			
Folic acid		Period 2		Means
0	9.75	11.24	11.52	10.84
250 mg. L^{-1}	11.35	11.70	11.90	11.65
500 mg. L^{-1}	11.98	12.18	12.08	12.08
LSD. 0.05	0.49			0.28
Means	11.03	11.71	11.84	
LSD. 0.05	0.28			

Chlorophyll a

Table 6 displays the results for the two periods showing that covering with vitamin E and B9, as well as their combination, meaningfully increased leaf chlorophyll a. With an increase of 43.50, 15.94, 38.66, and 16.42% compared to focuss of 0 and 250 mg L-1 for the two periods, respectively, the highest average for this attribute was 191.74 and 194.84 for the two periods when the focus was 500 mgL^{-1}. Vitamin B9's involvement in several biological processes may explain this, as it promotes the synthesis of glycine, an ingredient in chloroplast membrane-resident porphyrins and chlorophyll (19, 22). The peak values for the two periods were 172.90 and 175.06, respectively, when a focus of 2 ml L-1 of “vitamin E” was covered, as shown in the same Table. Vitamin E's antioxidant properties may be to blame; these properties shield chloroplast membranes from light damage, allowing chlorophyll to be retained (15), in agreement with (23). As compared to the other vitamin B9 focuss (0 and 250 mg L^{-1}), the trait response was meaningfully altered when covering with vitamin E at focuss ranging from 0 to 2 ml L^{-1}, indicating a strong contact in this trait. Hence, at vitamin E and B9 focuss ranging from 0 to 250, the rise in leaf chgrowinglorophyll a content was sustained. This improvement remained even after the covering solution's focus was raised to 500 mg L^{-1}, peaking at 1 ml L^{-1} of vitamin E. Moreover, this quality went downhill in the first period and didn't change much in the second, even though the vitamin content went up to 2 ml L-1.

Table 6. The impact of “vitamin B9” and E covering on “wheat plant” chlorophyll levels

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	109.36	140.72	150.74	133.61
250 mg L^{-1}	157.67	158.71	179.72	165.37
500 mg L^{-1}	184.49	202.51	188.23	191.74
LSD 0.05	5.88			3.39
Means	150.51	167.31	172.90	
LSD 0.05	3.39			
Folic acid		Period 2		Means
0	121.38	148.64	151.52	140.51
250 mg L^{-1}	157.11	161.99	182.96	167.35
500 mg L^{-1}	186.85	206.97	190.71	194.84
LSD 0.05	7.17			4.14
Means	155.11	172.54	175.06	
LSD 0.05	4.14			

Chlorophyll b

Table 7 shows that the effects of covering with ‘vitamins B9’ and E, also the contact between the two, on the increase of chlorophyll b content in leaves varied meaningfully for the two periods. With an average leaf chlorophyll b content of 55.02 and 53.89 for the two periods, respectively, exceeding the 500 mg L^{-1} vitamin B9 focus, the comparison treatment had the lowest leaf chlorophyll b content, at 40.36 and 37.25, for the same two periods. There was no statistically significant difference between the two periods' treatment focuss of vitamin E; however, plants treated with 1 ml/L in the first and 2 ml L^{-1} in the second period achieved the highest averages of 50.17 and 49.78, respectively, for this attribute. This could be because vitamin E protects plants against light oxidation, heat, dryness, and salt, leading to an increase in chlorophyll content in the leaves (a finding that is in agreement with the results of (23). The reaction of this characteristic varied with increasing covering focuss of “vitamin E and vitamin B9”. Although, covering more ‘vitamin E’ at a dosage of 2 ml L^{-1} and more vitamin B9 at a value of 0 to 250 mg L^{-1} resulted in an increase in the chlorophyll b content of the leaves. This feature was less pronounced in the first period when the vitamin E focus was 2 ml L^{-1}, but it remained at 500 mg L^{-1} when the covering focus was 1 ml L^{-1}. After increasing the covering dosage to 500 mg/L and the vitamin E covering focus from 0 to 1 ml L^{-1} in the second period, there was a small but noticeable decrease in the chlorophyll b content of the leaves.

Table 7. effects of “vitamin B9” and E covering on ‘wheat plant’ chlorophyll

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	38.59	40.75	41.73	40.36
250. mg L^{-1}	48.28	53.24	53.81	51.78
500. mg L^{-1}	54.65	56.52	53.88	55.02
LSD. 0.05	2.65			1.53
Means	47.17	50.17	49.81	
LS.D 0.05.	1.53			
Folic. acid		Period 2		Means
0	30.80	38.91	42.03	37.25
250 mg L^{-1}	49.65	52.93	53.89	52.16
500 mg L^{-1}	55.25	53.01	53.41	53.89
LS.D. 0.05	4.23			2.44
Means	45.24	48.28	49.78	
L.S.D 0.05	2.44			

Total chlorophyll content of leaves

Results from the two periods' worth of covering with "vitamins B9" and E, as well as their contact, were shown to impact the total chlorophyll content of the leaves, as shown in Table 8. The focus of 500 mg L^{-1} of vitamin B9 meaningfully exceeded by record the highest average for this trait amounting to 245.39 and 247.36, with an increase of 41 83 and 39.93% related to the no vitamin covering handling for the two periods respectively. This might be because, according to Tables 6 and 7, the chlorophyll a and b content of the leaves was higher at a focus of 500 mg/L. This is supported by the results of (24, 25), which show that their total chlorophyll content has increased. As the treatment covered with a focus of 2 ml L^{-1} exceeded, giving the highest average for this trait amounting to 221.48 and 223.60, the relevance of covering with vitamin E is shown in the same Table. With a focus of 1 ml L^{-1} of this vitamin, the experimental group outperformed the control group by an average of 196.61 and 199.25 during the first period, and 216.30 and 219.59 during the second. As chlorophyll a and b levels rise, the overall amount of chlorophyll in leaves also rises. In addition, the total content increased since covering the leaves with vitamin E enhanced their content at the same focus. The results of (26, 38, 48) are in agreement with this outcome. There was a statistically significant relationship between the two variables throughout the year. Results from the same Table demonstrate that total chlorophyll content rose in correlation with covering vitamin E focus when folic acid focus increased from 0 to 500 mg L^{-1}. Regardless, this growing slowed down when the vitamin B9 covering dosage was raised to 2 ml L^{-1} for one period and 500 mg L^{-1} for the other.

Table 8. Influence of "vitamin B9" and E covering on wheat leaf chlorophyll content

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	147.17	180.48	191.40	173.01
250 mg L^{-1}	204.83	210.81	232.26	215.97
500 mg L^{-1}	237.82	257.60	240.77	245.39
LSD 0.05	6.84			3.95
Means	196.61	216.30	221.48	
LSD 0.05	3.95			
Folic acid		Period 2		Means
0	151.33	186.50	192.47	176.77
250 mg L^{-1}	205.64	213.76	235.54	218.31
500 mg L^{-1}	240.77	258.52	242.77	247.36
LSD 0.05	5.70			3.29
Means	199.25	219.59	223.60	
LSD 0.05	3.29			

Biological yield

Table 9 shows that between the two time periods, there were statistically significant variations in the plant's biological yield as a result of the effects of covering with vitamin E and' vitamin B9'. Focuses of 0 and 250 mg L^{-1} recorded averages of 14.79, 17.24, 14.99, and 17.45 Mg ha-1 for the two periods, respectively, but the 500 mg L^{-1} focus recorded the highest average of 19.57 and 19.70 Mg ha-1 for this feature. Table 4 shows that the maximum dry weight was 500 mg L^{-1} at 100% blossoming and booting, which increased biological yield by producing more tillers per unit of input. This is why this focus is preferable. In the same Table, we can see that 2 ml L^{-1} of "vitamin E" is bigger to 0 and 1 ml L^{-1}, with averages of 16.48, 17.19, 16.67, and 17.40 Mg ha-1 for the two periods, respectively, when it comes to this trait. The highest average is 18.06 Mg ha^{-1}. The plant's dry weight increased during the booting and 100% flowering stages, which in turn increased the plant's biological yield at full maturity. This was due to the improved growth characteristics, such as the number of tillers and the flag leaf area, which were observed after covering the plant with vitamin E (Tables 2 and 3). The biological yield was found to be meaningfully lower for both periods when the covering focuss of vitamin E were increased from 0 to 2 ml L^{-1}, as shown in the same Table. Boosting the vitamin B9 spray focus from zero to five hundred milligrams per liter also enhances the biological yield. For this characteristic, the best average across the two periods was 20.00 Mg ha-1 for 500 mg L^{-1} vitamin B9 and 10.20 Mg ha-1 for 1 ml L^{-1} "vitamin E". On the other hand, average values of 13.80 and 13.86 Mg ha^{-1}, respectively, were the lowest in the comparison treatment that did not spray the two vitamins.

Table 9. Impact of "vitamin B9" and E covering on wheat biological income (mg ha^{-1})

Vit B9 (Folic acid)	Vit E α-tocopherol 0	1 ml^{-1}	2 ml^{-1}	Means
		Period 1		
0	13.80	14.79	15.77	14.79
250 mg L^{-1}	16.49	16.78	18.45	17.24
500 mg L^{-1}	19.15	20.00	19.56	19.57
LSD 0.05	0.77			0.44
Means	16.48	17.19	17.93	
LSD 0.05	0.44			
Folic acid		Period 2		Means
0	13.86	15.10	16.00	14.99
250 mg L^{-1}	16.78	17.00	18.56	17.45
500 mg L^{-1}	19.36	20.10	19.63	19.70
LSD 0.05	0.82			0.47
Means	16.67	17.40	18.06	
LSD 0.05	0.47			

From the study, it could be concluded that covering the wheat plant "with vitamin B9 (folic acid) and vitamin E (tocopherol) improved the studied growing trait"s, as the "superior focus in most of these traits was 500 mg L^{-1} of vitamin B9 and 2 ml L^{-1} of vitamin E.

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