Response of three American grape cultivars (*Vitis vinifera* L.) to EM Bokashi and foliar spraying with some plant extracts.

Maysa Ahmed Keitan **Akram Abdel-Kadhim Hadi**

Al-Furat Al-Awsat Technical University , Al-Mussaib Technical College

Abstract:

The experiment was conducted in lathhouse of one of the private farms near the Technical College / AlMusayib for the period from September 2022 to July 2023. To study the effect of EM Bokashi and foliar spraying with some plant extracts on three cultivars of American grapes, the experiment included three factors, as the first factor included three cultivars of grapes They are (Summer Royal Seedless, Flame Seedless, Crimson Seedless)As for the second factor, it included the addition of EM Bokashi in two levels (without adding, adding 250 g. seedlings^{-1}), while the third factor included foliar spraying with plant extracts in four levels, namely (without spraying, the aqueous extract of licorice root powder at a rate of 15 ml L^{-1}, the aqueous extract of leaves Kumquat petals at a concentration of 15 ml L^{-1} and Moringa Leaves Extract 15 ml L^{-1})The research was conducted as a factorial experiment (3 * 2 * 4) with a complete randomized block design (RCBD) and with three replicates, as each replicate includes 96 seedlings, 3 seedlings for each experimental unit.The results were as follows. The treatment of triple interaction between the cultivar Summer Royal Seedless and the ground addition of EM Bokashi at a rate of 250 g.Seedling^{-1} interfering with the foliar spraying of the Moringa Leaves Extract at a concentration of 15 ml L^{-1} (C1B1E2)) gave a significant increase in the rate of seedling height, number of leaves relative chlorophyll in leaves and the content of the leaves of nitrogen, phosphorus and potassium compared to the treatment of the cultivar Crimson and the absence of the addition of EM Bokashi and the absence of foliar spraying (C3B0E0), which recorded the lowest average of the studied traits.

introduction

The grape, *vitis vinifera* L, belongs to the genus vitis, and it is one of the 14 genera belonging to the Vitaceae family. (Al-Saeedi, 2000), and the original home of European grapes is the region located in Central Asia between the south of the Black Sea and the Caspian Sea, and from it all other grape cultivars originated before the discovery of the North American continent, then its cultivation spread in the east and west [4].The world has recently turned to the use of microorganisms and organic fertilizers to reduce pollution to plants, humans and the environment by using natural materials such as organic and biological fertilizers [3]and among these fertilizers is Bokashi fertilizer, which is one of the bio-fermented organic fertilizers and has received wide attention from It was accepted by researchers because it contains a wide spectrum of microorganisms that colonize the root zone and promote growth by increasing the availability of nutrients, rebuilding organic matter, modifying soil properties and increasing its moisture retention [9] Interest has begun at the present time in non-industrial plant extracts, which have an important role in preserving the integrity of the environment, and the tendency to use natural materials that are mostly non-polluting to the environment and somewhat low costs [2] . There are many seedless cultivars whose cultivation has not spread commercially despite the appropriate environmental conditions for their cultivation in Iraq and the multiplicity of its fields of use, as it is suitable for fresh consumption as table grapes, drying grapes, or the production of juice, where it is characterized by its absence of seeds and the high percentage of sugars in

ISSN 2072-3857

it, which makes it desirable by the consumer, so it is necessary to pay attention to these seedless cultivates and know the extent to which their production can be increased in Iraq Through organic fertilization with EM Bokashi and foliar spraying with some plant extracts, among these American cultivars are Summer Royal Seedless, Flame Seedless and Crimson Seedless . Given the importance of these factors, this study came with the aim of knowing the effect of EM Bokashi fertilizer and foliar spraying with some plant extracts on three grape cultivars in some traits

Materials and Methods

The experiment was conducted in lathhouse of one of the private farms near the Technical College / Al-Musauib for the period from September 2022 to July 2023. To study the effect of EM Bokashi and foliar spraying with some plant extracts on three cultivars of American grapes, the experiment included three factors, as the first factor included three cultivars of grapes They are (Summer Royal Seedless, Flame Seedless, Crimson Seedless) As for the second factor, it included adding EM Bokashi in two levels (without adding, adding 250 ml . seedlings^{-1}). As for the third factor, it included foliar spraying with plant extracts in four levels, namely (without spraying, the aqueous extract of licorice root powder at a rate of 15 ml L^{-1}, Aqueous extract of kiwi petal leaves 15 ml L^{-1} and Moringa Leaves Extract 15 ml L^{-1}). The research was carried out as a factorial experiment (3 * 2 * 4) with a complete randomized block design (RCBD) , as each replicate includes 96 seedlings, 3 seedlings for each experimental unit. The results were analyzed according to the analysis of variance, and the averages were compared using the Genstat 2010 test under the 5% probability level. Spraying was conducted on the vegetative seedlings using an automatic sprinkler until the degree of complete wetness of the seedlings, and the spraying was conducted in the early morning, while the untreated seedlings (control) were sprayed with distilled water only.

Table (1) Some physical and chemical properties of soil

units	values	traits	No.
g.kg^{-1}	723	sand	1
g.kg^{-1}	155	silt	2
g.kg^{-1}	122	clay	3
----	Sandy loam	Soil separator	4
g.kg^{-1}	3.6	organic matter	5
----	7.1	pH	6
mlmol	1.6	EC	7
mg.kg^{-1}	23.70	N	8
mg.kg^{-1}	0.64	P	9
mg.kg^{-1}	25.08	K	10

studied traits

1- The seedling's height (cm) The height of the seedlings was measured after the end of the experiment from the area of contact of the main stem with the soil to the top of the branch using a metric tape for each repeater, then the average was extracted.

ISSN 2072-3857

2- The number of leaves: was calculated for each plant.

3- Relative chlorophyll in leaves (SPAD unit): It was estimated for mature and fully expanded leaves by a Spade-502 Chlorophylmeter equipped by Minolta Co. LTD JAPANESE LIMITED.

4- The content of the leaves of mineral elements N, P, K, mineral elements was estimated in the laboratories of the Technical College of Al-Musayyib, Department of Plant Production Techniques. In perforated paper bags, then dried in an electric oven (Oven) at a temperature of 70 degrees Celsius for 48 hours until the weight is stable. After drying, the paper models were ground using an electric grinder. Then 0.5 gm was taken from each sample and digested by adding sulfuric acid and perchloric acid to obtain colorless extracts ready for mineral determination [2] According to the recommendations of [1] and the elements were estimated according to what was stated by nitrogen [10], phosphorus [8] and potassium [9]

Results :

1- Seedling height (cm):

The results in Table (2) show that there are significant differences between the cultivars in the rate of seedling height. Summer Royal (C1) gave a significantly excelled of 108.58 cm compared to the Crimson cultivar (C3), which recorded the lowest average of 75.75 cm. It is noted from the same table that the ground addition of the EM Bokashi gave a significant increase for the same trait . The treatment (B1) excelled by giving it the highest rate of 96.78 cm compared to the control treatment (B0), which gave the lowest rate of 83.44cm. As for the treatment of spraying with plant extracts, treatment (E2) recorded a significant increase in the rate of seedling height of 99.33 cm, while the control treatment gave (E0) the lowest rate was 85.33 cm. As for the bi-interaction between the treatments, the results of the table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 119.42 cm compared to the treatment (C3B0), which gave the lowest rate of 71.42 cm.As for the interaction between cultivars and foliar spraying with plant extracts, treatment (C1E2) recorded the highest rate of seedling height of 119.00 cm, while treatment (C3E0) gave the lowest rate of 69.83 cm. We note from the same table that the bi- interaction between EM Bokashi and foliar spraying of plant extracts As treatment (B1E2) gave the highest rate of 106.56 cm for treatment B1E2)Compared with the control treatment (B0E0), which gave a clear decrease of 79.22 cm. As for the triple interaction (C B E), we note from the same table that there is a significant effect on the rate of seedling height. Treatment C1B1E2 gave the highest rate of 129.33 cm compared to treatment C3B0E0, which gave The lowest rate was 66.00 cm.

ISSN 2072-3857

Table (2) The effect of Bokashi EM and foliar spraying with some plant extracts and their interactions on seedlings height (cm) of three grape cultivars

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
97.75	94.67	108.67	96.67	91.00	B0	Summer Royal Seedless C1
119.42	120.00	129.33	115.67	112.67	B1	
85.83	84.67	91.33	86.67	80.67	B0	Flame seedless C2
94.92	93.33	100.67	97.67	88.00	B1	
71.42	71.00	76.33	72.33	66.00	B0	Crimson seedless C3
80.08	77.00	89.67	80.00	73.67	B1	
effect of cultivars C						
108.58	107.33	119.00	106.17	101.83	C1	Interaction between cultivars and plant extracts C x E
90.38	89.00	96.00	92.17	84.33	C2	
75.75	74.00	83.00	76.17	69.83	C3	
EM Bokashi's effect B						
83.44	92.11	85.22	79.22	83.44	B0	Interaction between plant extracts and E x B EM Bokashi
96.78	106.56	97.78	91.44	96.78	B1	
	90.11	99.33	91.50	85.33	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
1.398	1.141	1.614	1.977	2.795	2.282	3.953

ISSN 2072-3857

- Number of leaves

The results of Table (3) show that there are significant differences between the cultivars in the average number of total leaves. The cultivar Summer Royal (C1) gave a significantlt excelled of 57.00 leaf seedlings^{-1} compared to the cultivar Crimson (C3), which recorded the lowest rate of 46.12 leaves seedlings-1, and it is noted from The same table shows that the ground addition of EM Bokashi gave a significant increase for the same trait, as the treatment (B1) excelled by giving it the highest rate of 57.25 leaf seedlings^{-1} compared to the control treatment (B0), which gave the lowest rate of 47.00 mm. As for the treatment of spraying with plant extracts, it was recorded The treatment (E2) showed a significant increase in the mean of the total number of leaves, amounting to 58.72 leaf seedlings $^{-1}$, while the control treatment (E0) gave the lowest rate of 46.17 leaf seedlings $^{-1}$. As for the bi-interaction, the results of the same table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 61.00 leaf seedlings $^{-1}$compared to treatment C3B0, which gave the lowest rate of 41.00 leaf seedlings $^{-1}$. As for the interaction between cultivars and foliar spraying with plant extracts, the treatment (C1E2) recorded the highest rate in the total number of leaves amounting to 67.67, while the treatment (C3E0) gave the lowest rate of 41.33 leaf seedlings-1, and we note from the same table that the bi- interaction between EM Bokashi and foliar spraying with extracts botanical, as it gave a significant increase for the same trait amounted to 63.56 leaf seedlings $^{-1}$ for the treatment (B1E3) compared to the control treatment (B0E0), which gave a clear decrease of 40.00 leaf seedlings $^{-1}$. As for the triple interaction (C B E), we note from the same table that there is a significant effect in Average number of total leaves, treatment (C1B1E2) gave the highest rate of 71.33 leaf seedlings $^{-1}$compared to treatment C3B0E0), which gave the lowest rate of 35.33 leaf seedlings $^{-1}$.

Relative chlorophyll in leaves (SPAD unit)

The results of Table (4) indicate that there are significant differences between the cultivars in the content of leaves of chlorophyll. The cultivar Summer Royal (C1) gave a significantly excelled of 41.59 SPAD compared to the cultivar Crimson (C3), which recorded the lowest rate of 28.77 SPAD. It is noted from the same table that the ground addition For EM Bokashi, it gave a significant increase for the same trait, where the treatment (B1) excelled by giving it the highest rate of 38.20 SPAD compared to the control treatment (B0), which gave the lowest rate of 32.35 SPAD. As for the treatment of spraying with plant extracts, treatment (E2) recorded a significant increase in the leaf content of Chlorophyll reached 38.93 SPAD, while the control treatment (E0) gave the lowest percentage of SPAD 31.62. As for the bi-interaction treatments, the results of the same table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 46.58 compared to the treatment (C3B0), which gave the lowest rate of 27.01 SPAD. As for the interaction between cultivars and foliar spraying With plant extracts, treatment (C1E2) recorded the lowest rate of 47.16 SPAD, while treatment (C3E0) gave the lowest rate of SPAD of 26.68, and we note from the same table that the bilateral interaction between EM Bokashi and foliar spraying with plant extracts showed a significant increase for the same trait amounting to 41.55 SPAD for treatment B1E2).) compared to the control treatment (B0E0), which recorded a decrease of SPAD amounted to 28.92, as for the triple interaction treatments (C B E), we note from the same table that there is a significant effect on the content of leaves of chlorophyll, treatment (C1B1E2) gave the highest content of 52.45

ISSN 2072-3857

SPAD compared to treatment C3B0E0)) SPAD.
which recorded the lowest content of 25.19

Table (3) The effect of EM Bokashi and foliar spraying with some plant extracts and their interactions on the average number of total leaves (leaf seedlings $^{-1}$) of three grape cultivars.

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
53.00	51.67	64.00	55.67	40.67	B0	Summer Royal Seedless C1
61.00	58.67	71.33	61.00	53.00	B1	
47.00	47.00	50.67	46.33	44.00	B0	Flame seedless C2
59.50	59.00	64.33	58.00	56.67	B1	
41.00	38.67	47.00	43.00	35.33	B0	Crimson seedless C3
51.25	50.33	55.00	52.33	47.33	B1	
effect of cultivars C						
57.00	55.17	67.67	58.33	46.83	C1	Interaction between cultivars and plant extracts C x E
53.25	53.00	57.50	52.17	50.33	C2	
46.12	44.00	51.00	47.67	41.33	C3	
EM Bokashi's effect B						
47.00	45.78	53.89	48.33	40.00	B0	plant extracts and Bokashi EM E x B
57.25	56.00	63.56	57.11	52.33	B1	
	50.89	58.72	52.72	46.17	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
0.84	0.68	0.97	1.18	1.16	1.37	2.37

ISSN 2072-3857

Table (4) The effect of EM Bokashi and foliar spraying with some plant extracts and their interactions on the Relative chlorophyll in leaves (SPAD unit)of three grape cultivars.

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
36.60	35.98	41.84	37.98	30.59	B0	Summer Royal
46.58	45.12	52.45	49.24	39.52	B1	Seedless C1
33.45	31.63	37.95	33.22	30.99	B0	Flame seedless
37.48	36.93	39.31	38.41	35.26	B1	C2
27.01	26.16	29.13	27.57	25.19	B0	Crimson seedless
30.53	30.23	32.88	30.86	28.17	B1	C3
effect cultivars C						
41.59	40.55	47.16	43.61	35.05	C1	Interaction between cultivars and plant extracts C x E
35.46	34.28	38.63	35.81	33.12	C2	
28.77	28.19	31.00	29.22	26.68	C3	
EM Bokashi's effect B						
32.35	31.26	36.32	32.92	28.92	B0	Interaction between plant extracts and E x B EM Bokashi
38.20	37.43	41.55	39.50	34.32	B1	
	34.34	38.93	36.21	31.62	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
0.68	0.57	0.79	0.96	1.36	1.11	1.93

ISSN 2072-3857

The percentage of nitrogen in the leaves:

The results in Table (5) indicate that there are significant differences between the cultivars in the percentage of nitrogen in the leaves. The cultivar Summer Royal (C1) gave a significantly excelled of 2.52% compared to the cultivar Crimson (C3), which recorded the lowest rate of 1.24%. It is noted from the same table that the addition The ground of EM Bokashi gave a significant increase for the same trait, as the treatment (B1) excelled by giving it the highest rate of 1.95% compared to the control treatment (B0), which gave the lowest rate of 1.59%. As for the treatments sprayed with plant extracts, treatment (E2) recorded a significant increase in The percentage of nitrogen in the leaves was 1.91%, while the control treatment (E0) gave the lowest percentage of 1.61%. As for the bilateral interaction between the treatments, the results of the same table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 2.80% compared to the treatment (C3B0), which gave the lowest rate of 1.13%. As for the interaction between cultivars and spraying The foliar treatment with plant extracts, the treatment (C1E2) recorded the highest percentage of nitrogen in the leaves, amounting to 2.78%, while the treatment (C3E0) gave the lowest rate of 1.15%. It amounted to 2.06% for the treatment (B1E2) compared to the control treatment (B0E0), which recorded a decrease of 1.36%. As for the triple interaction treatments (C B E), we note from the same table that there is a significant effect on the nitrogen content of the leaves. The treatment (C1B1E2) gave the highest percentage of 2.94 % compared to treatment (C3B0E0), which gave the lowest rate of 1.05%.

The percentage of phosphorus in the leaves:

The results in Table (6) indicate that there are significant differences between the cultivars in the percentage of phosphorus in the leaves. Summer Royal (C1) gave a significant superiority of 0.58% compared to the Crimson (C3) cultivar, which recorded the lowest rate of 0.18%. It is noted from the same table that the addition The ground of EM Bokashi gave a significant increase for the same trait, where the treatment (B1) excelled by giving it the highest rate of 0.77% compared to control treatment (B0), which gave the lowest rate of 0.34%, while the treatment of spraying with plant extracts, treatment (E2) recorded a significant increase in the percentage The percentage of phosphorus in the leaves was 0.46%, while control treatment (E0) gave the lowest percentage of 0.32%.As for the bi-interaction treatments, the results of the table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 0.69% compared to the treatment (C3B0), which gave 0.16%. As for the interaction between cultivars and foliar spraying with plant extracts, it was recorded The treatment (C1E2) had the highest percentage of phosphorus in the leaves, reaching 0.69%, while the treatment (C3E0) gave the lowest percentage of 0.14%, and we note from the same table that the bi-interaction between EM Bokashi and foliar spraying with plant extracts gave a significant increase for the same trait amounting to 0.51% for treatment B1E2)) compared to the control treatment (B0E0), which recorded a decrease of 0.25%. As for the triple interaction treatments (C B E), we note from the same table that there is a significant effect on the percentage of phosphorus in the leaves. Treatment (C1B1E2) gave the highest rate of 0.59% compared to treatment C3B0E0)) which gave the lowest rate of 0.12%.

ISSN 2072-3857

Table (5) Effect of EM Bokashi and foliar spraying on some plant extracts and their interactions on the plant Percentage of nitrogen in the leaves of three grape cultivars.

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
2.24	2.23	2.62	2.33	1.79	B0	Summer Royal
2.80	2.75	2.94	2.79	2.72	B1	Seedless C1
1.39	1.44	1.55	1.35	1.22	B0	Flame seedless
1.69	1.65	1.83	1.67	1.62	B1	C2
1.13	1.22	1.50	1.21	1.05	B0	Crimson seedless
1.35	1.41	1.43	1.32	1.25	B1	C3
effect cultivars C						
2.52	2.49	2.78	2.59	2.26	C1	Interaction between cultivars and plant extracts
1.54	1.54	1.69	1.51	1.42	C2	
1.24	1.32	1.29	1.22	1.19	C3	C x E
EM Bokashi's effect B						
1.59	1.63	1.77	1.60	1.36	B0	Interaction between plant extracts and
1.95	1.94	2.06	1.92	1.86	B1	E x B EM Bokashi
	1.78	1.92	1.76	1.61	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
0.03	0.02	0.03	0.04	0.06	0.05	0.09

ISSN 2072-3857

Table (6) Effect of EM Bokashi and foliar spraying with some plant extracts and their interactions on the percentage of phosphorus in the leaves of three grape varieties.

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
0.47	0.49	0.59	0.50	0.31	B0	Summer Royal Seedless C1
0.69	0.66	0.79	0.72	0.61	B1	
0.38	0.38	0.44	0.42	0.31	B0	Flame seedless C2
0.46	0.47	0.51	0.45	0.41	B1	
0.16	0.16	0.21	0.16	0.12	B0	Crimson seedless C3
0.20	0.19	0.22	0.21	0.16	B1	
effect cultivars C						
0.58	0.58	0.69	0.61	0.46	C1	Interaction between cultivars and plant extracts C x E
0.42	0.43	0.47	0.43	0.37	C2	
0.18	0.17	0.22	0.19	0.14	C3	
EM Bokashi's effect B						
0.34	0.34	0.41	0.36	25.00	B0	Interaction between plant extracts and E x B EM Bokashi
0.45	0.44	0.51	0.46	0.40	B1	
	0.39	0.46	0.41	0.32	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
0.02	0.02	0.02	0.03	0.04	0.03	0.05

ISSN 2072-3857

percentage of potassium in the leaves:

The results of Table (7) indicate that there are significant differences between the cultivars in the percentage of potassium in the leaves. Summer Royal (C1) gave a significant superiority of 3.11% compared to the Crimson C3 cultivar, which recorded the lowest rate of 1.62%. It is noted from the same table that The ground addition of EM Bokashi gave a significant increase for the same trait, where the treatment (B1) excelled by giving it the highest rate of 2.58% compared to control treatment (B0), which gave the lowest rate of 2.39%. As for the treatment of spraying with plant extracts, the treatment (E2) recorded a significant increase in the percentage The percentage of potassium in the leaves was 2.59%, while the control treatment (E0) gave the lowest content of 2.38%. As for the bilateral interaction, the results of the table show that there are significant differences between the cultivars and the ground addition of EM Bokashi. The treatment (C1B1) recorded a significant effect of 3.18% compared to the treatment (C3B0), which gave the lowest rate of 1.56%. As for the interaction between cultivars and foliar spraying with plant extracts The treatment (C1E3) recorded the highest percentage of potassium in the leaves, reaching 3.19%, while the treatment (C3E0) gave the lowest content, amounting to 1.57%. We note from the same table that the bilateral interaction between EM Bokashi and foliar spraying with plant extracts gave a significant increase for the same trait amounting to 2.6 % for the treatment (B1E1)) compared to the control treatment (B0E0), which recorded a decrease of 1.49%. As for the triple overlap treatments (C B E), we note from the same table that there is a significant effect on the percentage of potassium in the leaves. The treatment (C1B1E1) gave the highest content of 3.25% Compared to treatment C3B0E0, which gave the lowest rate of 1.49%.

Discussion

The reason for the difference in the effect of cultivars on the studied traits must be addressed The review of the previous results showed the increase in the vegetative traits and the content of the leaves of Relative chlorophyll and nutrients as a result of the addition of EM Bokashi. These biological species are available in the growth medium, and this effect has greatly encouraged the supply of nitrogen to the seedlings, which is directly involved in the composition of nucleic, amino and organic acids, as well as other nutrients such as phosphorus and potassium, which are necessary for the growth and development of the plant, as well as the increase in the secretion of many growth regulators that can It is provided by these biological species present in Bokashi mixture, which stimulate the uptake of nutrients by the plant, which increases the indicators of vegetative and root growth[6] . and the results of the previous tables showed positive results and significant differences in the indicators of vegetative growth and the content of leaves of chlorophyll and nutrients as a result of treatment with extracts Moringa leaf extract had an effective role in increasing the studied traits, and the reason for this may be attributed to what this extract contains of nutrients necessary for the processes of photosynthesis, respiration and various metabolic processes such as iron and magnesium, which have a large and important role in the plant, or the reason may be due to the fact that the extract of Moringa leaves It contains substances that encourage growth, such as vitamins (B1, B2, and B3), which have an important role in the metabolism of carbohydrates and the construction of amino acids, which represent the basic units for building proteins,

ISSN 2072-3857

Table (7) Effect of cultivars, EM Bokashi and foliar spraying with some plant extracts and their interactions on the percentage of potassium in the leaves.

interaction between cultivars and EM Bokashi C x B	E Foliar spraying with plant extracts				EM Bokashi B	cultivars C
	E3	E2	E1	E0		
3.04	3.01	3.12	3.05	2.99	B0	Summer Royal
3.18	3.15	3.25	3.17	3.13	B1	Seedless C1
2.57	2.54	2.76	2.71	2.25	B0	Flame seedless
2.86	2.83	2.93	2.87	2.80	B1	C2
1.56	1.58	1.64	1.53	1.49	B0	Crimson seedless
1.70	1.58	1.81	1.75	1.64	B1	C3
effect cultivars C						
3.11	3.08	3.19	3.11	3.06	C1	Interaction between cultivars and plant extracts
2.71	2.68	2.85	2.80	2.52	C2	
1.63	1.58	1.73	1.64	1.57	C3	C x E
EM Bokashi's effect B						
2.39	2.38	2.51	2.43	2.24	B0	Interaction between plant extracts and
2.58	2.52	2.66	2.60	2.52	B1	E x B EM Bokashi
	2.45	2.59	2.51	2.38	E EFFECT OF SPRAYING WITH PLANT EXTRACTS	

L.S.D 0.05

C	B	E	C x B	C x E	B x E	C x B x E
0.02	0.02	0.02	0.03	0.43	0.04	0.06

ISSN 2072-3857

which in turn play an important role in increasing vegetative growth. Also, this extract contains large amounts of proteins and carbohydrates that are used In providing the energy needed for the growth and construction process, which leads to an increase in traits of vegetative growth, in addition, the Moringa extract has multiple roles in increasing the vital and physiological activities of the plant, as it accelerates the growth of young plants, strengthens the plants, and increases growth indicators[5]

Through the research, we can conclude that the interaction between the ground application of EM Bokashi at a rate of 250 gm Seedling-1 combined with foliar spraying of Moringa leaf extract at a concentration of 15 ml.L-1 with the cultivar Summer Royal seedless gave the best results in vegetative traits and leaf content of nutrients and chlorophyll. Therefore, we recommend dealing with these organic materials because they are natural materials that do not harm the environment compared to chemical compounds, and they also contribute widely to improving the nutritional status of the plant.

References

1. A.O.A.C. .1970.Association of official agriculture chemist. Official Methods of Analysis II th edition, washington D.C., USA. P. 545.
2. Al-Sahhaf, Fadel Hussein. 1989. Soilless cultivation systems. Baghdad University. House of Wisdom. Higher Education Press. Mosul. Iraq.
3. Dadashzadeh , S.: M. Yarnia and H.D. Panah (2013). Effect of nitroxin bio-fertilizer on yield and yield component of potato cultivars in Sarab region. International journal of Agronomy and Plant Production, 4 (12) 3152-3156.
4. Hassan, J. A. and M. A. Salman .1989. Production of grapes. House of Wisdom, University of Baghdad, Ministry of Higher Education and Scientific Research, Iraq.
5. Hegazi, A.Z., Ismaiel, A.Y and Anany, T.G. 2015. Improving Growth and Seed Yield of Squash by Foliar Applications with Moringa Leaf Extract, Ascorbic Acid or Benzyladenine. Egypt Journal of Horticulture, 42(1): 579-590.
6. Hussain, T.; A. D. Anjum and Tahir, J. 2002. Technology of beneficial microorganisms. NatureFarm Environ.
7. Jakson, M. L. 1958. Soil chemical analysis. Englewood cliffs prentic – Hall inc. Newjersey, U. S. A. pp. 498.
8. John , M.K .1970. Colorimetric Determination of Posphoruse in soil and plant materials with ascorbic acid soil science , 109:214.
9. Karimuna, L.; N. M. Rahni and Boer, D. 2016. The use of bokashi to enhance agricultural productivity of marginal soils in southeast Sulawesi, Indonesia. J. Tropical Crop Sci., 3(1): 1–6.
10. Page, A. I. 1982. Methods of soil analysis. Part 2. Chemical and Microbiological.

ISSN 2072-3857