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Research Paper

The Effect of Spraying Boron and Seaweed Extracts (kelpak) on Vegetative Growth Characteristics and Concentration of Some Medically Active Substances for Lemon Grass (Cymbopogon Citratus L.)

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Abstract

This study includes the effect of spraying boron and seaweed extracts kelpak in the vegetative growth characteristics and concentration of some medically active substances for lemongrass plant. The experiment used a randomized complete block design with three replications. The Medians treatments have compared using Duncan's test with multi limits at 5% possibility. The results arrived at can be summed up as follows. Discriminate treatment (B1K1) the highest rate of number of leaves (9.61 leave/plant) and the highest rate in plant height (134.14 cm), compared with comparison transaction (B0K0) it gave the lowest rate for the number of leaves and less height of the plants. While the treatment giving overlap (B2K2) the highest moral value Percentage of dry matter for total vegetative (24.00) and the highest rate of percentage of dry matter for total root (33.00) and the highest rate of leaves area (168.08 cm2/leave) and the highest total chlorophyll concentration (35.18 SPAD) Compared with the least in comparison transaction (B0K0) that gave less rate in percentage of dry matter for total vegetative and root and the less total chlorophyll concentration. Influenced treatment (B1K1) in the concentrations of the activeA substances to give it the highest concentrations of Myrcene (3.47 mg/gm) and Citral (28.01 mg/gm) and Limonene (42.72 mg/gm) and Geraniol (38.42 mg/gm) compared to the rest of the other transactions, while the lower concentrations of these in the treatment comparison (B0K0).

Keywords: *Kelpak, Lemon Grass, Medically Substances, Seaweed Extracts, Spraying Boron, Vegetative Growth.*

1. Introduction

Lemongrass (Cymbopogon citratus L.) is one of the most widely used medicinal plants since ancient times. It is an aromatic herb with long, smooth leaves, similar to the leaves of the Halva plant. It lives in warm countries such as Egypt, Sudan, Saudi Arabia, India, Ancient and modern studies have shown that this plant has many medicinal benefits for its high content of pilot oil, which contains many compounds, especially the main compound Citral, be one of the most important sources of Vitamin (A) and the compound of Myrcene and Geraniol (Gajbhiye et al., 2013).

This plant is used as an antiseptic and analgesic And treatment of rheumatism, as it is an antihypertensive and useful in the treatment of ulcers and colitis as well as cold and flu, an inhibitory for the growth of microorganisms and fungi, It was also used industrially in the preservation of food and add flavor to it, and used in other industries such as soap, toothpaste, and air fresheners. As the number of people on the planet increased, accompanied by an increase in modern-day diseases and the risk of side-effects of the chemical drugs used, all of these reasons were enough to guide or advise people to go to nature in the search for medicinal plants to treat diseases. The most of the diseases that we suffer find a solution in nature more than in pharmacy

and pharmacology is taking advantage of the largest field of natural herbs for the installation of drugs and medicines (Uskoković, 2018; AL- Saed, 2009; Ahmadi, 2018).

There have been many studies and studies on the use of microelements in the paper fertilization on the plant because of its great importance to the plant where Boron has an important role in keeping calcium soluble and regulating the absorption of calcium and potassium as well as contributes to the transfer of carbohydrates such as sugar. The Seaweed Extracts are sprayed on the vegetative group, where they are considered as leaf fertilizers because they contain many major and minor nutrients, Oxins and Geberlines, which stimulates the division and elongation of the cells, causing the increase of leaf area and increasing the efficiency of photosynthesis and thus improving vegetative and root growth of the plant (Basavaraja, 2018; Datta, 2007; Battacharyyae et al., 2015; Trivedi, 2018).

Furthermore, the importance of lemongrass plant therefore, the study aimed at the following:

1- Study the effect of boron spray on Characteristics of vegetative growth and concentration of Some Medically Active Substances for the plant.

2- Study the effect of spraying Seaweed Extracts (kelpak) on Characteristics of vegetative growth and concentration of Some Medically Active Substances for the plant.

3- Study of the most important substances medically active and influential in the diseases of the age and increase concentrations of physiological transactions.

This study includes the effect of spraying boron and seaweed extracts kelpak in the vegetative growth characteristics and concentration of some medically active substances for lemongrass plant

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(two years old) and planted in pots of 18 cm diameter. The experiment used a randomized complete block design with three replications. The Medians of treatment were compared using Duncan's test with multi limits at 5% possibility. The Interference between Spraying boron and Seaweed Extracts were applied in some vegetative growth and the production of medically active substances in plant leaves.

2. Materials And Methods

Perform the search: This study was carried out at the Technical College / Kirkuk for the agricultural season (2017) The plants were planted in pots of 18 cm diameter filled with the mixture and Bitmus at a rate of 2: 1 with four samples per treatment, each three axes three times according to the (RCBD) design and the global experiments. It includes the effect of spraying boron and seaweed extracts kelpak in the vegetative growth characteristics and concentration of some medically active substances for lemongrass plant (two years old) and planted in pots of 18 cm diameter. The first-factor boron concentration used 10 mg/ L symbol B1 and spray with 15 mg / L and symbol B2, in addition to the treatment of non-boron spray and symbol B0. The second factor used spray 2.5 ml/ L of seaweed extracts kelpak and symbol K1 and spraying 5 ml/ L and symbol K2, in addition to the treatment of non-spraying with seaweed extracts and symbol K0. Table (1) shows the physical and chemical properties of the sands used in the research and the table (2) shows some important climatic elements during the study period.

Table 1: Shows some physical and chemical properties of the soil experiment

Description	Description	Content	Units
Soil separators	Sand	٦١,٧٦	%
	Silt	٢٠,٨٨	%
	Clay	١٧,٣٦	%
Soil texture	Sandy Loam		
Organic matter	O.M	8.1٧	%
Soil reaction	PH	7.2٦	
Cationic exchange capacity	CEC	20.2٥	100 g / Meq
Total nitrogen	Total Nitrogen	0.0٧١	%
Available phosphorus	Available Phosphorus	٣١,٧٤	Mg / kg
Available Potassium	Available Potassium	١٠,٢٣	Mg / kg
Calcium carbonate	$CaCO_3$	30.6٥	%
Electrical conductivity	ECE	1.6٣	dS / M

The sample was analyzed in the General Authority for Agricultural Research / Soil Research Department – Baghdad

Table 2: Rates of maximum and minor temperatures and relative humidity of the research area

Relative humidity (%)	Minimum temperatures	Maximum temperatures	Months
٣٩	١٤,٥	٢٧,٣	April
٣٧	٢١,٢	٣٣,٥	May
3٢	٢٥,٨	٤٠,٦	June
٢١	٢٨,١	٤٣,٢	July
20	30.1	45.6	August

Obtained from the Meteorological Department / Kirkuk

Research Design: The study was carried out according to the Randomized Complete Block Design (R.C.B.D). The experiment included two factors: Spraying Boron and Seaweed Extracts (kelpak) in three Treatments. The data were statistically analyzed using ANOVA and the mean of the multimodal Dunkin experiment was measured at 5% probability level (Rawi and Khalafallah, 2000).

Experimental Transactions:

B0K0 (Comparative treatment without spraying)
B0K1 (2.5 m/ L kelpak) without using boron
B0K2 (5 m/ L kelpak) without using boron
B1K0 (10 m/ L boron) without using kelpak
B1K1 (10 m/ L boron + 2.5 m/ L kelpak)
B1K2 (10 m/ L boron + 5 m/ L kelpak)
B2K0 (15 m/ L boron) without using kelpak
B2K1 (15 m/ L boron + 2.5 m/ L kelpak)
B2K2 (15 m/ L boron + 5 m/ L kelpak)
The experiment was carried out twice in the first week of April and the next spraying applies after two weeks of the first spraying.

Studied aspect of Vegetative Growth Characteristics

Plant height: The length of each plant was measured from the surface level of the soil to the top (Beginning and end of study) by the longest sheet and for the four plant pot and for each treatment and extracting the plant length rate of the experimental unit.

Number of leaves: All the leaves were counted for each of the four-plant pot (Beginning and end of study) and the average was extracted for the experimental unit.

Dry matter for total vegetative: The leaves of four plants were taken from each treatment and placed in dishes and dried in an Electric oven at a temperature of 65-70 m until the weight is stable and then the dry weight is estimated using the sensitive balance (Al - Sahaf, b 1989).

Dry matter for total root: The roots of four plants were taken from each treatment and placed in dishes and dried in an Electric oven at a temperature of 65-70 m until the weight is stable and then the dry weight is estimated using the sensitive balance. (Al - Sahaf, b 1989).

Leaves area: The leave area of the leaves whose length was measured was calculated according to the following formula: Paper area = maximum length x width x 0.75

Total chlorophyll concentration: The total chlorophyll concentration in leaves was measured by selecting four leaves from each plant using the Chlorophylmeter type of Spade-502 from Mintolta Co.LTD Ltd.

Determination of active compounds: The concentrations of the active substances in the samples were estimated using HPLC Type LC-2010 Spectrophotometer-Spd-6A-Uv Spectrophotometer, the data were recorded by the Computer Which is used to paint the chromatograph and standard plant vehicles have been used as separated and identified as space Standard Peak area and Retention time Then, the time of storage, the area and the height of the samples obtained from the sample injection were measured. The packages obtained were then compared with the standard solution packages produced under the same conditions for plants (Nishizawa and others, 1991).

All samples that have been diagnosed under the same separation conditions have taken place Measurements in White Fields Company / Baghdad / Waziriya. The concentration of compounds in the model was calculated according to the following equation:

The concentration of the compound in the sample = area of the compound package × concentration of the standard model (known) x dilution factor Standard package space.

3. Results And Discussions

The effect of spraying boron and seaweed extracts (kelpak) and their overlap on vegetative growth Characteristics. Table (3) shows that the spraying of plants with boron causes a significant increase in the number of Leaves, plant height, the concentration of chlorophyll, leaves area and percentage of dry matter for total vegetative and root compared to comparison plants. Also spraying with Seaweed Extracts (kelpak) had a positive effect on all these traits compared to the comparison treatment.

Either overlap between spraying plants with boron and Seaweed Extracts (kelpak) It was significant The treatment (B1K1) was marked at the highest rate of number of leaves (9.61 leave/ plant)

and the highest rate in plant height (134.14 cm) compared with plants that gave the lowest values for these qualities, it gave the lowest rate for the number of leaves (5.41 leave/ plant) and less height of the plants (114.67 cm), while the treatment (B2K2) giving the highest moral value Percentage of dry matter for total vegetative (24.00) and the highest rate of percentage of dry matter for total root (33.00) and the highest rate of leaves area (168.08 cm^2 / leave) and the highest total chlorophyll concentration (35.18 SPAD) Compared with the least in comparison transaction that gave less rate in percentage of dry matter for dry matter for total vegetative (16.34) and less rate in percentage of dry matter for dry matter for total root (20.67) and less rate of leaves area (136.97 cm^2 / leave) and the less total chlorophyll concentration (22.71 SPAD) .

Table 3: Effect of Spraying Boron and Seaweed Extracts (kelpak) on Vegetative Growth Characteristics of plant Lemon Grass. *Cymbopogon citratus* L.

Chlorophyll concentration (SPAD)	Rate of leaves area (cm^2 / leave)	Percentage of dry matter for total root	Percentage of dry matter for total vegetative	Number of leaves (leave/ plant)	Height of the plants (cm)	Factor
c 25.71	c 134.29	c 24.12	c 19.56	c 6.94	c 115.81	B_0
a 32.18	b 152.38	b 28.00	b 20.67	a 9.24	a 132.07	B_1
b 28.87	a 160.51	a 31.45	a 22.89	b 7.67	b 121.12	B_2
b 25.88	c 139.42	c 24.92	c 19.26	c 7.25	c 119.30	K_0
a 30.31	b 164.13	b 28.09	b 21.67	b 8.15	b 122.97	K_1
a 31.22	a 167.01	a 30.59	a 22.42	a 8.87	a 128.46	K_2
g 22.71	g 136.97	g 20.67	g 16.34	f 5.41	f 114.67	B_0K_0
f 25.84	g 137.81	f 24.00	e 20.67	de 7.54	e 118.95	B_0K_1
ed 28.45	f 143.96	e 27.66	cd 21.67	cd 7.87	d 122.17	B_0K_2
d 28.83	ef 145.40	f 24.34	cd 21.67	b 8.64	c 125.93	B_1K_0
ab 33.89	e 147.10	de 29.00	b 23.00	a 9.61	a 134.14	B_1K_1
cde 30.46	d 155.76	bcd 30.67	c 22.00	a 9.47	de 120.36	B_1K_2
fg 24.07	c 160.18	e 27.67	f 19.34	de 7.54	bc 127.87	B_2K_0
abc 32.12	b 163.85	bc 31.00	cd 21.67	e 7.41	b 128.98	B_2K_1
a 35.18	a 168.08	a 33.00	a 24.00	d 7.84	b 131.02	B_2K_2

Numbers with the same letter or similar letters do not have significant differences according to the Dunkin Multipliers test at the 5% probability level.

This increase in the features of vegetative growth can be attributed to the role of boron in many functions and events within the plant, where boron is considered as an essential element for plant growth and development (Al – Sahaf, 1989). It also plays a role in the safety and development of cell wall, cell division, plasma membranes, phenol metabolism, a plant requirement for nitrogen stabilization and in the reproductive growth of plants and it's important role in the process of cell proliferation and expansion of metastatic tissue and the formation of bags and also has an important role in the building and movement of plant hormones, especially IAA, and stimulate its work and stimulate or inhibit specific pathways of metabolism. (Ahmad *et al.*, 2009).

also, this increase in vegetative growth may be attributed to Seaweed Extracts the content of Oxins, which have an effective role in cell division and expansion, leading to increas the vegetative growth (leaves area and dry weight of the plant). Seaweed Extracts also contains Cytokines, which promote physiological activity and increase the total chlorophyll of the plant, which positively affects the effectiveness of the process Photovoltaic and processed materials are positively reflected on the traits of vegetative growth (Pise and Sabale, 2010). The reason for the vegetative growth of plants is due to content of Seaweed Extracts from main and micro elements such as iron It is important to activate the oxidation and reduction enzymes in the electron transmission chain by breathing and help build it Chlorophyll and iron storage in the chloroplast Phytoferritin, which leads to increase in vegetative growth and the mechanism of action of cytokinein it stimulates the formation of some enzymes, including some building enzymes And may bring some amino acids and convert them to proteins and acid RNA, which in turn delays the manifestations of aging and preserves non-breakage of chlorophyll and then Preserving the green color of the leaves and this may be due to increased chlorophyll content (O'Dell, 2003) .

The effect of spraying boron and seaweed extracts (kelpak) and their overlap on Some Medically Concentrations of Active Substances.

The figure (1, 2, 3, 4, 5, 6, 7, 8, 9) show That there are overlapping effects between a decrease and an increase in concentrations of active substances, all of these overlaps were superior to treatment Influenced treatment (B1K1) in the concentrations of the active substances to give it the highest concentrations of Myrcene (3.47 mg / gm) and Citral (28.01 mg / gm) and Limonene (42.72 mg / gm) and Geraniol (38.42 mg / gm) compared to the rest of the other transactions, while the lower concentrations of these in the treatment comparison (B0K0) as given (1.32 mg /gm) and (16.82 mg / gm) and (31.74 mg / gm) and (29.76 mg / gm). While the treatment (B2K0) gave highest concentrations of Farnesol (3.21 mg / gm) and the Linalool (8.4 mg / gm) compared to the rest of the other transactions, while the lower concentrations of these in the treatment comparison (B0K0) as given (1.45 mg /gm) and (5.46 mg / gm) of these materials respectively . The microelements are no less important than the major elements in their impact on the course of operations And in increasing the production of active compounds, boron activates some enzymes in the plant, especially responsible for the production of phenolic materials (Edhwani, 2004). As well as may be due to the action of micro-elements in increasing the effectiveness of photosynthesis and thus increase secondary metabolites (Tamimi and Dori, 2010).

It may be to do marine of seaweed extracts and their effect on growth and increase absorption Nutrients thus increases secondary metabolites and also be attributed to Containment to Oxins, which have an effective role in cell division and expansion, leading to a larger vegetative volume and more space Leaves and dry weight of the plant (Gollan and Wright, 2006) . It may be to their effect on growth and increase absorption Nutrients thus increases secondary metabolites (Tamimi, 2009).

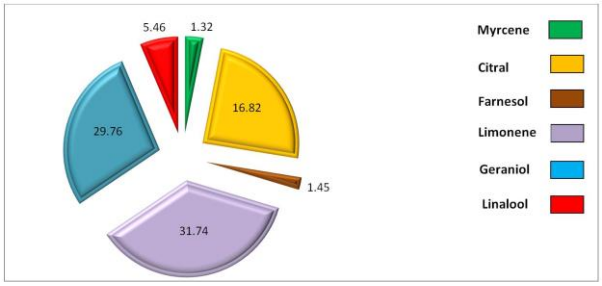


Fig. 1: Concentrations of active substances of lemongrass plant in Treatment (B0K0)

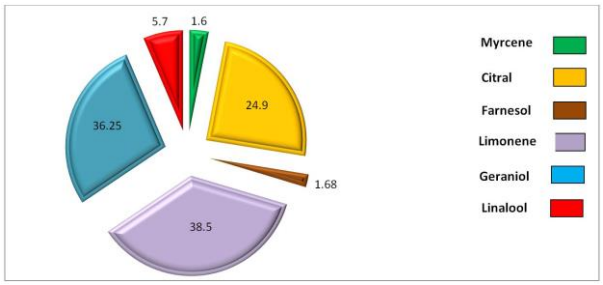


Fig. 2: Concentrations of active substances of lemongrass plant in Treatment (B0K1)

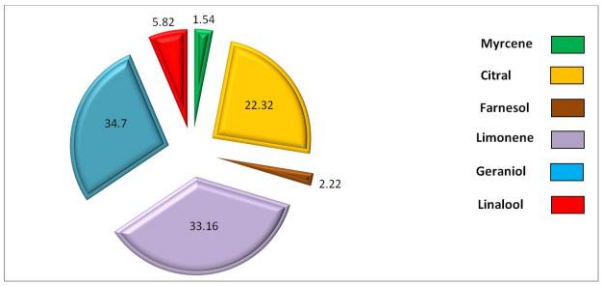


Fig. 3: Concentrations of active substances of lemongrass plant in Treatment (B0K2)

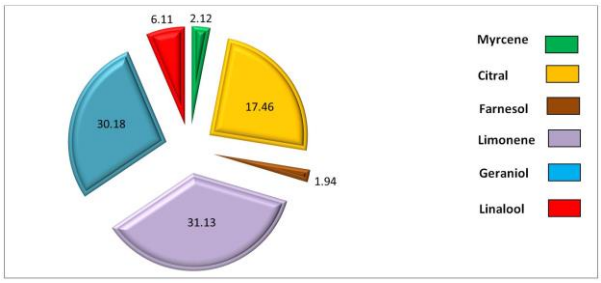


Fig. 4: Concentrations of active substances of lemongrass plant in Treatment (B1K0)

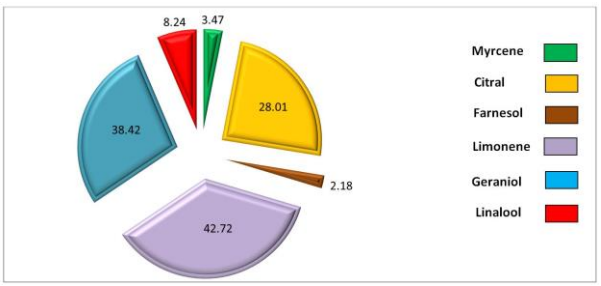


Fig. 5: Concentrations of active substances of lemongrass plant in Treatment (B1K1)

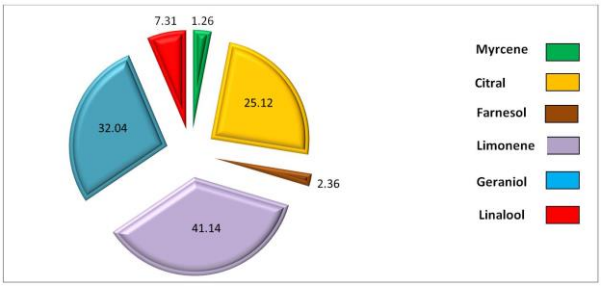


Fig. 6: Concentrations of active substances of lemongrass plant in Treatment (B1K2)

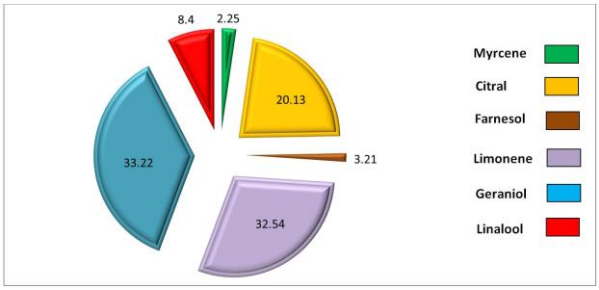


Fig. 7: Concentrations of active substances of lemongrass plant in Treatment (B2K0)

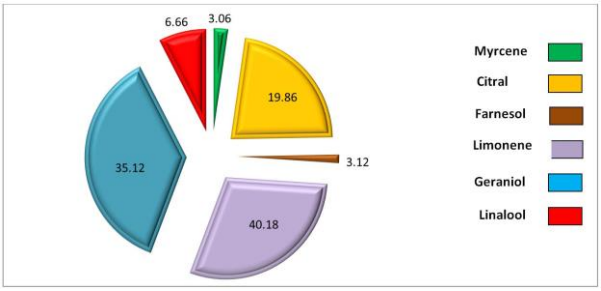


Fig. 7: Concentrations of active substances of lemongrass plant in Treatment (B2K1)

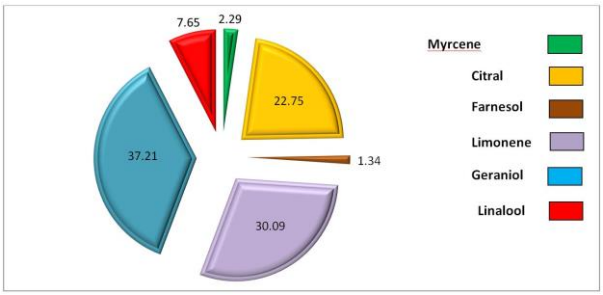


Fig. 8: Concentrations of active substances of lemongrass plant in Treatment (B2K2)

4. Conclusions

The response of lemongrass plant for Spraying with (10 mg/ L boron) and (15 mg/ L boron) in the traits of vegetative growth and the production of medically active substances. Spraying with Seaweed Extracts (2.5 m / L) and (5 m/ L kelpak) significantly affected on vegetative growth and concentration of some active substances found in plant leaves. The Interference between Spraying boron and Seaweed Extracts was significant in some vegetative growth In transactions (B1K1) and (B2K2) and the production of medically active substances in plant leaves In transactions (B1K1) and (B2K0).

Recommendation

• Conducting various studies on many other medicinal plants using different factors to improve vegetative growth properties and to produce medically active substances for these plants.

• The need to conduct experiments to influence the other micronutrients in improving the qualities of growth and content of nutrients and the production of medically active substances.

• The use of Seaweed Extracts when cultivating medicinal plants has a direct effect on improving vegetative and plant growth characteristics.

References

[1] Ahmadi, A., Mousazadeh, M., Torabi, S.A. and Pishvaee, M.S., 2018. OR Applications in Pharmaceutical Supply Chain Management. In Operations Research Applications in Health Care Management. Springer, Cham: 461-491.

[2] Al - Sahaf, F. H., 1989. Applied Plant Nutrition. Dar al-Hikma-University of Baghdad- The Republic of Iraq.

[3] Al - Sahaf, F. H b., 1989, Farming systems without the use of soil. Higher Education Press- Mosul Republic of Iraq.

[4] AL- Saed, A. M., 2009. Dictionary of medicinal herbs in the Arab world. First Edition, Alfa Publishing & Distribution Co., Cairo.

[5] Al-Rawi, K.M. and Khalaf-Allah, A.M., 1980. Design and analysis of agricultural experiments. El Mousel Univ., Iraq, 19, p.487.

[6] Battacharyya, D., Babgohari, M.Z., Rathor, P. and Prithiviraj, B., 2015. Seaweed extracts as biostimulants in horticulture. Scientia Horticulturae, 196:39-48.

[7] Basavaraja, P.K., Yogendra, N.D., Zodape, S.T., Prakash, R. and Ghosh, A., 2018. Effect of seaweed sap as foliar spray on growth and yield of hybrid maize. Journal of Plant Nutrition, 41(14):1851-1861.

[8] Datta, S.C., 2007.Plant physiology,New age International (P) Limited.puplishers, 4835/24, ansari road,daryagany,New Dellhi.

[9] Edhwani, A. K., 2004. Effect of fertilization and spraying with some nutrients in Quantitative and qualitative properties of some active compounds in seeds of two varieties of ring. thesis PhD - Faculty of Agriculture - University of Baghdad - Ministry of Higher Education and Scientific Research - Republic Iraq.

[10] Gajbhiye, B.R., Momin, Y.D. and Puri, A.N., 2013. Effect of FYM and NPK Fertilization on Growth and Quality Parameters of Lemongrass (Cymbopogon flexuosus). Agricultural Science Research Journals, 3(4):115-120.

[11] Gollan, J.R. and Wright, J.T., 2006. Limited grazing pressure by native herbivores on the invasive seaweed Caulerpa taxifolia in a temperate Australian estuary. Marine and Freshwater Research, 57(7):685-694.

[12] NISHIZAWA, H., OKIMURA, S., WATANABE, Y. and ABE, Y., 1991. Application of liquid particle extraction to the purification of glycyrrhizin. Chemical and pharmaceutical bulletin, 39(4):969-971.

[13] O'Dell, C.R., 2009. Natural plant hormones are biostimulants helping plants develop higher plant antioxidant activity for multiple benefits.

[14] Pise, N.M. and Sabale, A.B., 2010. Effect of seaweed concentrates on the growth and biochemical constituents of. Journal of Phytology.

[15] Rasheed, M.K., 2009. Role of boron in plant growth: a review. J. Agric. Res, 47(3).

[16] Tamimi, J. Y., 2009. Effect of humic acid and herbal extracts Marine growth and chemical qualities oil recipes for rosemary (Rosemarinus officinalis L). Proceedings of the Sixth Scientific Conference - Department of Life Sciences - Faculty of Education - University of Tikrit.:1-17.

[17] Tamimi, J. Y and Dori, T. S ., 2012. Effect of spray elements. Micro-growth and the chemical content and active substance of celery plant (Apium graveolence L.). Proceedings of the Seventh Scientific Conference - Department of Life Sciences Faculty of Education - University of Tikrit.

[18] Uskoković, V. and Uskoković, D.P., 2018. Nanotechnologies in preventive and regenerative medicine: Quo Vadis, Domine?. In Nanotechnologies in Preventive and Regenerative Medicine:513-566.