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EFFECT OF BREAD YEAST ANDHUMICACID ON GROWTH AND YIELD TRAITS ON BROAD BEAN (*Vicia Faba L.)*

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ABSTRACTS

The study was carried out during the 2017-2018, fall growing season in the college of Agriculture, University of Dohuk, Kurdistan region, Iraq.In order to determine the effects of effect of bread yeast with concentration (0, 2 and 4g.L) and humic acid with two concentration (9 and 18m.L)on growth and yield of broad bean (*Vicia faba L.*) local cultivars **which were grown in the field.Results showed that the broad bean were good in vegetative growth characters, quality and yield characteristic when spraying plant with (18m.L^{-1}) compared with other treatments. Best results in total chlorophyll content (47 SPAD) when using humic acid at (9m.L^{-1}). Significant increase shown in leaf area in plant spraying with (18.L^{-1}) of humic acid which record (6.66cm^2) higher number of (leaves .plant^{-1}) shown in plant sprayed with (9m.L) that gave (900 leaf.plant^{-1}), Total weight of pod (g.plant^{-1}) were showed in plant treated with (18m.L) of humic acid that gave (1073.33g.plant). Results also showed significant different in the nodule length and number of it that recorded in plants spraying with (18m.L) of humic acid which recorded (13.33mm and 20 nodules .plant^{-1}) respectively. Mineral contents (NPK), showed high percentages which were (1.88, 0.76 and 0.76%) respectively when treating plant with (18m.L^{-1}) of humic acid, compared to the untreated plant with humicacid which gave lower percentages.**

KEY WORDS: Biostimulants, Growth, yield Chemical composition Broad bean.

1. INTRODUCTION

Broad bean is nutritionally important vegetable all over the world. The seeds containing 20-36% protein for human and animal consumption.While in Iraq especially Al waste country recorded 49.9 thousand ton in the year 2016 after this Baghdad came in the second grade that measured the productivity about 18.1, 14.3 thousand ton (Statistical analysis of Iraqi .,2016)

Bread yeast (*Saccharomyces cerevisiae)* is considered as a type of bio-fertilizer which is usually added to soil or as foliar application on vegetable crops (El-Ghamry *et al*., 1990) because its nutrition properties as well as its produce substances like growth regulators such as gibberellins and auxins (Sarhan and Sharif 1988), and its ability to produce a group of enzymes (Dinkha and Khazrge 1990). Yeast treatment suggested to participate beneficial role in improving growth of vegetable crops which reported by (Hewedy *et al*. (1996) ,Fathy*et al*., (2000),and Sarhan (2008).

Humic acids are characterized as a heterogeneous natural resource, ranging in colour from yellow to black, having high molecular weight, and resistance to decay. Humic acid, as a commercial product contains 44-58% C, 42-46% O, 6-8% H and 0.5-4% N, as well as many other elements (Larcher, 2003; Lee and Bartlette, 1976). It improves soil fertility and increases the availability of nutrient elements by holding them on mineral surfaces. Thehumic substances are mostly used to remove or decrease the negative effects of chemical fertilizers from the soil and have a major effect on plant growth, as shown by many scientists (Linchan, 1978; Ghabbour and Davies, 2001;Pal and Sengupta, 1985).

The yield per unit area in Iraq is still too low comparing with world production.

It were reported that humic acids affect physical and chemical properties of soils (Vaughan andLinehan1976;Boyle*et al*,.1989). In

many studies, humic and fulvic acids preparations were reported to increase the uptake of mineral elements (Maggioni *et al.* 1987; De Kreij& Basar1995; Mackowiak *et al*.,2001), to promote the root length and to increase the fresh and dry weights of crop plants (Kauser*et al*.,1985). Due to the positive effect of humic substances on the visible growth of plants, these chemicals have been widely used by the growers instead of other substances such as pesticides etc. This, however, has led to growers using higher-amounts of these substances.The aim of this study is to test the effect of bread yeast extract and humic acid on growth, yield and quality traits of broad bean (*Viciafaba L*).

2. MATERIALS AND METHODS

The experiment was done on 1stNovember to10April 2018,at the research farm, College of Agriculture, University of Dohuk, Kurdistan region, Iraqon broad bean(*Vicia faba L.*) local variety. , the land was ploughed for two perpendicular lines and the soil was well softed, the whole area was divided into the three blocks, each experiment units consist of three row of 2×1m,seeds were planted at distances of 40cm,.at the third upper part of the one side of the ridge , the fertilizer process by adding animal manure before planting and the soil were irrigated then the seeds was planted(Matlob*et al*., 1989).Randomize Completely Block Design (R.C.B.D.) was used in this study, the experiment included two factorin clude the two concentration of Humic acid (9 and 18m.L^{-1}) and the second factorwasthree concentration (0 and 2 and 4g..L^{-1}) of bread yeast with after one month of planting the plants were sprayed three times within 15 intervals day on the other hand all needed agricultural and horticultural process was done regularly during this study.(Matlob*et al*., 1989).

The experimental traits was study as follows Vegetative growth traits, that include (Leaf area, total chlorophyll content (SPAD) it was determined by using Spad Meter -502, Konica Minolta), plant length (cm), number of branch dry and fresh weight of vegetative growth also Quality traits of bean that include (Pods weight (g), number of seed. pod^{-1}, pods number.plant-1 , pods length (cm), length and width of nodules (mm).) and Yield traits of broad bean that include (Cloves weight (g) and cloves number total weight of cloves (g.plant^{-1}).(Matlob*et al*., 1989).

Statistical analysis the obtained data was statistically analyzed by using SAS program,(SAS, 2007) program .

3. RESULTS

Results in table (1) showed that there was a significant effect of humic acidontotal chlorophyll content, treating plants with humic acid (9ml.L^{-1}) recorded (47 SPAD) compared with untreated plant that gave lower value (43.33 SPAD).In the same time there was significant differences in chlorophyll content as a result of the concentration of bread yeasts at (4g.L^{-1}) that recorded significant increase as compared with untreated plants.

It was showed that there were significant increase in the leaf area.in regard to leaf area (cm^2) compared to untreated plant, Furthermore plant treated with humic acid gave the highest value of the leaf area (6.61)cm^2 compared with control (3.17cm^2). Plant treated with (4g.L^{-1}) of yeast extract recorded (4.37) cm^{2}as compared with untreated one.

Table (1) also showed significant increase in branch number. Plant^{-1}, plant length (cm) and leaf number.plant^{-1} significant increase when sprayingwith (9ml.L^{-1}) of humic acid gave higher value with regard in (branch number. Plant^{-1},plant length (cm) and leaf number.plant^{-1}) that recorded (18, 121.67 and 900) respectively , as compared with untreated plants (control).

Table (1) show there was significant effect in results of pod number.plant^{-1} length of pod when plant treated with humic acid at concentration (186m.L), had high number of pod and high length of pod (70 pod.plantand^{-1},14.04cm.) respectively as compared with the untreated plant (44.00 and 12.33).

It also indicates that plant treated with (18m.L) of humic acid and (4g.L) of bread yeast showed significant increase in the pod circumstance (mm)that gave higher circumstance of pod (7.04 and 6.89mm) as compared with untreated plants that gave lower circumstances (5.67 mm) as compared with control.

Table (1): Effects of bread yeast extract and Humic acid on vegetative growth characters of broad bean

Traits	Treatments				
	Untreated	Bread yeast (2g.L^{-1})	Bread yeast (4g.L^{-1})	Humic acid (9ml.L^{-1})	Humic acid (18ml.L^{-1})
Plant length (cm)	108.33b	124.67a	124.00a	121.67a	126.00a
Branch No.plant^{-1}	10.67c	15.33b	16.33ab	18.67a	18.00a
Leaf number.plant^{-1}	566.67c	733.33b	666.67bc	900.00a	683.33bc
Leaf area (cm^2)	3.17d	4.13b	4.37ab	4.19b	6.61a
Chlorophyll content (SPAD)	43.33c	46ab	46.33ab	47a	45.67a
dry wt.of vegetative growth(g.plant^{-1})	146.33c	251.67ab	198.67a	206.67ab	294.67a
fresh wt. of vegetative growth (g.plant^{-1})	740.67c	986.67ab	1024.67a	956.67ab	1123.33a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Table (2) in dictated thatthe length of nodules and number of nodules were significantly increased among humic acid and bread yeasts, 18m.Lof humic acid which gave better length of nodules (13.33 mm), compared with (8.33 mm) at untreated plants , in the other hand treating plant with 4gl.L^{-1} of bread yeasts differ significantly which recorded (9.88 mm)compared with (2g.L^{-1}) that gave lower value (8.67 mm).

Also it was showed that there are significant increases in number of nodules among humic acid and bread yeasts, plant treated with (18 m.L^{-1}) of humic acid gave high number which reach (20.00mm) as compared untreated plant that gave low number of nodules, treating plant with 4g.L^{-1} bread yeasts showed significant increase in the number of nodules that gave (18.33mm) of nodules compared with other treatments.

Results of fresh and dry weight of vegetative growth ofbroadbean indicated that treating plant with concentration (18m.L^{-1}) of humic acid and (4g.L^{-1}) of bread yeasts gave a significant increase in fresh and dry weight of vegetative growth which recorded (1123.33 and 294.67 g. Plant^{-1}) respectively, as compared with untreated plants which gave lower weight of fresh and dry weight. spraying plant with (4g.L^{-1}) of bread yeasts gave significant increase in fresh and dry weight of vegetative growth compared with untreated plants.

Table (2): Effects of bread yeast extract and Humic acid on qualitative characters of broad bean

Traits	Treatments				
	Untreated	Bread yeast (2g.L^{-1})	Bread yeast (4g.L^{-1})	Humic acid (9ml.L^{-1})	Humic acid (18ml.L^{-1})
(Pods No.Plant$^{-1)}$	44.00c	51.67b	51.67b	55.00b	70.00a
(Pods Length cm)	12.33c	13.67b	14.00a	13.67b	14.04a
Pod Circumstance(cm)	5.67c	6.67b	6.89ab	6.67b	7..04a
Length of Nodule(mm)	8.33c	8.67b	9.88ab	10.33ab	13.33a
Nodule No.plant^{-1}	10.00c	14.00b	18.33ab	15.00b	20.00a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Table (3) indicated thatthe seed weight were increased significantly among humic acid and bread yeasts, (18m.L) of humic acid gave high number of (seed .pod) (4.67) compared with control plants , in the other hand spraying plant with (18ml.L)of humic acid effective significant different and recorded higher weight of seed per pods (6.00g.seed) compared withcontrolthat gave lower weight of seed(2.93g).

Spraying plant with (18ml.L) of humic acid gave higher weight of pods compared with control, in the same time the higher total weight of pods per plant was recorded when use with (18m.L) of humic acid which gave highestweight of pods (1073.33g) compared with untreated plant.

Table (3): Effect of bread yeast extract and Humic acid on yield characters of broad bean

Treatment	Seed number .pod^{-1}	seed weight (g.seed^{-1})	pod weight (g.pod^{-1})	Total pod weight (g.plant^{-1})
Untreated	2.67c	2.93c	8.93c	393.07c
Bread yeast (2g.L^{-1})	4.00b	3.63b	15.33b	835.28ab
Bread yeast (4g.L^{-1})	4.33a	5.47ab	15.07b	778.44b
Humic acid (9ml.L^{-1})	4.04b	5.87ab	10.87b	597.67ab
Humic acid(18 ml.L^{-1})	4.67a	6.00a	16.17a	1073.33a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

Table (4) indicated a significant increase among humic acid and bread yeasts extract, (18m.L) and (4g.L^{-1}) respectively which gave highest nutrient content (N. P. and K%) which recorded high per cent of nutrient (N.P.K%) (1.88%, 0.98mand 1.44%) respectively when using high concentration of huic acid and (1.88, 0.93 and 1.33%) respectively when using high concentration of bread yeasts, compared with compared with untreated plant with humic acid and bread yeasts that recorded lowest value (1.23, 0.76 and 1. 04%)respectively.

Table (4): Effect of bread yeast extract and Humic acid on mineral nutrient percentage in broad bean.

Treatment	Nitrogen %	Phosphorus%	potassium %
Untreated	1.23c	0.76c	1.04c
Bread yeast (2g.L^{-1})	1.7ab	0.88b	1.21b
Bread yeast (4g.L^{-1})	1.88a	0.93a	1.33ab
Humic acid (9ml.L^{-1})	1.66b	0.93b	1.35b
Humic acid(18 ml.L^{-1})	1.88a	0.98a	1.44a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan's multiple range test at 5% level.

4. DISCUSSION

It is observed from the above mentioned results in Tables (1,2,3 and 4) that a significant increase occurred in plant lengths, number of branches, leaves number, leaves area, and total chlorophyll (SPAD) Increasing vegetative components by the spraying of humic acid may be attributed to the role of humic acid inmproving the soil fertility and increasing the availability of nutrient elements and consequently increased plant growth and may be due to the increase in the nutrient elements (N. P. K.) (1.88, 0.98 and 1.44%)that make the plant absorbed it more and increased the vegetative growth characters.

The plant growth characters may give the clear indicators on the size and dense of vegetative growth of cucumber plants, and this may refer to the number of flowers and quantity of fruits that can then produce from it (Basset, 1986 and AL-Mokhtar*et al*., 1991), or may be due to the role of humic acid that provides nutrient elements that share in bio efficiency and then increasing the growth (Abdel-Mawgoud*et al*., 2007), in addition to humic acid improve soil ventilation and this permit the root respiration and easily penetrate in the soil and then lead to increase the root growth that positively increased the vegetative growth through water and nutrient absorption (Garcia *et al* ., 2008).The microbes are also capable of producing auxins, cytokinins and gibberellins during vermin composting (Brown, 1995), which affect the plant growth appreciably (Tomati*et al*., 1990).

Moreover the enhancement of the plant growth using potassium humate had been reported to be due to increasing nutrients uptake such as N, Ca, P, K, Fe (Bijay, 1999). The application of humic acid through the irrigation water might increase the soil organic matter which improved the retention of nutrients and increased the soil microbial activity, which convert the nutrients from organic to mineralized form as reported by Stevenson (1994).

The increase in the plant height could be due to the application of humic acid since the acid has the ability to provide an acidic medium and correlate with positive ions to form a complex which is very important for trace elements (micronutrients) as these micronutrients are coheredtightly and protected from precipitation by these compounds. The humic acid is also a source of Nitrogen hence increasing the availability of nutrients (Phelps, 2000).Or the increase in qualitative character of cucumber may be due to the increase in photosynthesis products in plants, or due to high fruit weight, or may be due to the effect of humic acid and EM-1 that make increase in the total soluble solid and ascorbic acid, because of their effect on increasing the leaf area and the efficiency of photosynthesis (Jensen, 2004).

Improving yield could be related to the increasing of soil aggregates due to the high content of the organic matter in humic substances application. It is believed that humic acid being a poly functional molecule (Schnitzer and Khan, 1972 and Sposito, 1989) attracts micronutrients cations, preventing them from leaching and releasing them slowly to the plants (Emanuele, 1997). Humic acid have several ways of impacting the plant development. First, humic acids perform the physiological function of, and uptake, are growth stimulators, stimulating the plant growth and yield (Table 2, 3 and 4) and the chlorophyll (table1) improve the intake of nutrients from soil, and reduce the intensity of chemical absorption. (Jarienee*t al*., 2007).

Results from above tables (1,2,3 and 4) that gave positive significant effect when using humic acid and bread yeas the increase in vegetative growth character and quality characters may due to the role of humic acid and bread yeast This enhancement in the traitss of the vegetative shoot growth may attribute to the ability of yeast to increase the production of stimulants for plant growth, especially Gibberellins, Auxins and Cytokinins which work to improve the plant cell division and its growth.

These results may be attributed to the effect of bread yeast extract in increasing levels of endogenous hormones in treated plants which could be interpreted by cell division and cell elongation. In addition, these results may be due to the physiological roles of vitamins and amino acids in the yeast extract which increased the metabolic processes role and levels of indogenous hormones, i.e. IAA and GA3.

The positive effect of applying active dry yeast was attributed to its own contents of different nutrients, high percentage of protein, large amounts of vitamin B and natural plant growth regulators such as cytokinins(Al.Saaberi et al.,2005) . These results agree with those reported by Abou El – Nasr *et a*l.,2001) in squash.

Fathy *et a*l ., (2001) With regard to pod length and pod weight, the same data in Table (2) show clearly that the highest pod length and pod weight were recorded by treatment of dry yeast foliar spray with 2 g/l. while the lowest pod length and pod weight were recorded by the control treatment. These results held true in the two seasons of the study. In this respect, such increments in total produced yield and its components as a result of yeast spray are connected with the increase in plant growth.

Castro *et al*.,(1988) found that humic acid applied as folia sprays at 1 quart/acre greatly increased the yield of extra large fruits of tomato. Also, Hu and Wang (2001) mentioned that humic acid used as soil treatment or as spray at the seedling stage significantly increased the growth and yield of soybean plants. Afifi*et al.,* (2010) indicated that foliar application with humic acid improved nutrient status and promoted growth and yield components of faba bean plants. Mesut*et al.,(*2010) pointed that humic acid and phosphorus applications increased the growth and yield parameter of pepper seedling. The combined effects of humic acid and P application was significantly increased N, P, K, Ca, Mg, S, Mn and Cu contents of shoot of pepper seedling. Similar these results Gad El-Hak*et al*., (2012) obtained that foliar application of pea plants with humic acid is very beneficial to the crop growth and yield.

Sarwar *et al.,* (2012) reported that using soil application of humic acid at 50 mg kg-1along with 100% recommended dose of P fertilizer significantly enhanced grain weight 72% and No of pods/plant 22% as compared to 100%recommended dose of P fertilizer alone .The data in the table (4) indicate that there was a statistically significant effect for the foliar application treatments on the content of N, P and K elements in the seed of broad bean plants.

The highest values of all elements were recorded by using bread yeast at (4g.L) and humic acid at (18m.L^{-1}). This may be due to its effect on enhancing metabolism. They also found that extracts has an enhancing effect on the absorption and translocation of minerals (Sivakumar, *et al*.,2005) This might contribute to regulating the nutritional and the adaptability state of stressed plants (Jianguo, *et al*., 1998) Increasing P soil content due to the application of organic fertilizers , might be a result of its decomposition and producing organic acids, which increases the nutrients availability in the soil Mahmoud,. (2000).

5. REFERENCES

- A.O.A.C. (2000).Official Method of Analysis 11th edition Washington D.C. Association of official analysis chemist.P. 1015.
- Abd-Amawgoud, A.M.R.; N.H.M. EL-Greadly; Y.I. Helmy and S.M. Singer.(2007). Responses of tomato plants to different rates of humic-based fertilizer and NPK fertilization.Jour of Applied Sciences Research.
- Abou El – Nasr, M.E., R.A. El – Shabrawy and M.M. Abd El – Rahman, 2001. Effect of Bread yeast application and some nutrient elements on squash (CucurbitapepoL) plant growth, yield and fruit quality under conditions of the early summer planting .J. Agric. Sci. Mansoura Univ., 26(7): 4451-4464.
- Afifi, M.H.M., Mohamed M.F. &Shaaban H.A. (2010). Yield and nutrient uptake of somefaba bean varieties grown in newly cultivated soil as affected by foliar application of humic acid. J. of Plant Production, 1(1), 77-85.
- AL-Mokhtar, F.A.A; Z.A. Hussain; R.T. Romaan and Salwan. (1991). Deduction and evaluation of two new hybrids of field grown cucumbers, AL-Abaa Journal for Agricultural Researches, 2(2):17-22. (In Arabic).
- Al-Saaberi M. R. S. (2005). Effect of Some Agricultural Treatments on Growth, Yield of Lettuce Lactucaativa L. MS.C Thesis Horticulture Sciences University of Mosul College of Agriculture and Forestry.
- Anon.,(2005). Statistical data bases of Fao. Available from http://faostat.fao.org/default.aspx?alias=faostatclassic.
- Basset, M.J. (1986).Breeding of vegetable crops.AVI publishing Co. Ine. West Port, Connecticut. USA.
- Bijay, K.S. (1999). Plant Amino Acids. Biochemistry andBiotechnology.
- Boyle M., Frakenburger W.T., Stolyz L.H.(1989): The influence of organic matter on soil aggregation and water infiltration. Journal of Production Agricul-ture, 2: 290–299.
- Brown, G.G. (1995). How do earthworms affect micro floral and faunal community diversity? Plant Soil, 170: 209-231.
- Castro, B.F., S.J. Locascio and S.M. Olson (1988). Tomato response to foliar nutrient and biostimulant applications. Proceeding of the Florida State Horticultural Society. 101, 350-353.

– DeKreij C., Basar H. (1995): Effect of humicsubstances in nutrient film technique on nutrient uptake. Journal of Plant Nutrition, 18: 793–802.
– Dinkha R. F., T.O. and Al Khazragji, (1990). Nutrition and Fungus Function Science, University of Salahaddin, Ministry of High Education, Iraq. (In Arabic).
– El-Ghamry, E.A., H.M.E. Arisha and K.A.Nour (1999). Studies in tomato flowering, fruit set, yield and quality in summer seasons.1-spraying with thamine, ascorbic acid and yeast. Zagazig. J. Agric. Res. 26(5):1345-1364.
– Emanuele, M. (1997).Determination of trace metals complexed with humic acid in Antarctica marine sediments.Chemical speciation and Bio availability, Italy. 9(2):67-70.
– Fathy, E.S.L. and S. Farid (2001). The possibility of using vitamin Bs and yeast to delay senescence and improve growth and yield of common beans (Phaseolos vulgaris, L.). J. Agric, .Sci. Mansoura Univ., 21(4):1415-1423.
– Fathy, E.S.L. and S. Farid and S.A.El-Desouky (2000). Induce cold tolerance of outdoor tomatoes during early summer season by using triphosphate (ATP), yeast, another natural and chemical treatments to improve their fruiting and yield. J.Agric. Sci. Mansoura Univ., 25(1):377-401.
– Fathy, E.S.L., S. Farid and S.A. El Desouky, (2002). Induce cold tolerance of outdoor tomatoes during early summer season by using triphsphate (ATP), yeast, other natural and chemical treatments to improve their fruiting and yield. Agric. Sci. Mansoura Univ., 25(1): 377-401.
– Gad El-Hak, S.H., A.M. Ahmed, and Y.M.M. Moustafa (2012). Effect of foliar application with two antioxidants and humic acid on growth, yield and yield components of peas (Pisumsativum L.). Journal of Horticultural Science & Ornamental Plants 4 (3): 318-328.
– Garcia, M.C.V.; F.S. Estrella; M.J. lopez and Moreno. (2008). Influence of compost amendment on soil biological properties and plant dynamic soil.Dynamicplant.Special issue Compost (Guest Editor XiyingHao). 1(1):1-9.
– Ghabbour, E.A. and G. Davies (2001).Humic substances: Structures, models and functions, Royal Society of Chemistry, England.
– Hewedy, A. M., M. A. Morsy and M. Hafez (1996).Effect of frequency of fruit picking and foliar spray with some stimulants on the subsequent seed yield of eggplant. Egypt –Hung .Hort conf., 1:50-60.
– Hu Shuixiu and Wang Ruizhen (2001). A study on the effect of Komix, Humicacid containing organic fertilizer, on spring soybean. ActaAgriculturaeUniversitatisJiangxiensis, 23(4): 463- 466.
– Jariene, E; H.D. Anilcenko; J. kulaitiene and M. Gajewski.(2007). Effect of fertilizers on oil pumpkin seed crde fat, fiber and protein quantity.Agronomy Research. 5(1): 43-49.
– Jensen, E. (2004) Seaweed; fact or fancy.Published by Moses the Midwest Organic and Sustainable Education.From the broad Caster. 12(3): 164-170.
– Jianguo, Y.U.,Shuiying, Y.E.,Yujuan,Z.andYingchang, S.(1998). "Influence of humic acid on the physiological andbiochemical indexes of apple tress". Forest Res., Vol.(11), No.(6), pp.623-628.
– Kauser A. Malik, Azam F.(1985): Effect of humic acid on corn seedling growth. Environmental and Experi-mental Botany, 25: 245–252.
– Larcher, W. (2003). Physiological Plant Ecology: Ecophysiologyandstres physiology of functional groups, 4th. Edition, Springer, New York.
– Lee, Y.S., R.J. Bartlett (1976). Stimulation of plant growth by humic substances, Soil Science Society of America Journal. 40: 876-879.
– Linchan D. J. (1978).Humic acid and nutrient uptake by plants.Plant and Soil. 50: 663-670.
– Mattlob, A.N.; E.Sultan and K.S. Abdul.(1989). Vegetable production. Part two. Dar AL-Kutub publication on Mosul University, Iraq.(In Arabic).
– Mackowiak C.L., Grossl P.R., Bugbee B.G. (2001): Beneficial effects of humic acid on micronutrient availability to wheat. Soil Science Society of America Journal, 56: 1744–1750.
– MaggioniA ., Varanini Z ., Nardi S., Pinton R . (1987): Action of soil humic matter on plant roots: Stimulation of ion uptake and effects on (Mg2+, K+) ATPase activity. Science of the Total Environment, 62: 355–363.
– Mahmoud, M.R. (2000)."Improvement of soil fertility and sorghum production as a result of composts and phosphorus fertilizers application" .Minia J. of Agric. Res. and Develop. Vol.(20) No. (3), pp.553-572.
– Mesut K. Cimrin, ÖnderTürkmen, MetinTuran and BurcuTuncer (2010). Phosphorus and humic acid application alleviate salinity stress of pepper seedling. African Journal of Biotechnology Vol. 9(36), pp. 5845-5851.
– Pal, S. and M.B. Sengupta (1985). Nature and properties of humic acid prepared from

different sources and its effects on nutrient availability. Plant and Soil. 88: 91-95.
– Phelps, B. (2000). Humic Acid Structure and Properties. Phelps Teknowledge. 29/12/1424. http://www.pheplesteck.com
– Sarhan, T.Z. (2008). Effect of biological fertilizers, Animal residues, and Urea on Growth and yield of potato plant C.V. Desiree Solanumtuberosum L. Ph. D. Thesis Horticulture Sciences and Landscape Design (Vegetable), University of Mosul, College of Agriculture and Forestry.
– Sarhan.A.T. and F. M. Sharif (1988). Fungus Physiology, Dar Al–Kutub Publication. Mosul Univ. Iraq. (In Arabic).
– Sarwar, M., M. EhsanAkhtar, S. I. Hyder and M. ZameerKhan (2012). Effect of biostimulant (Humic Acid) on yield, phosphorus, potassium and boron use efficiency in peas. Persian Gulf Crop Protection, 1(4):11-16.
– SAS Institute, Inc (2007).Statistical analysis system. SAS institute Inc., Cary, NC. USA.
–
– Schnitzer, M. and S.U. Khan.(1972). Humic Substances in the Environment_.Marcel Dekker, Inc., New York.
– Sivakumar, K. and Devarajan, L.(2005).“Influence of K- humate on the yield and nutrient uptake of rice”. Madras Agricultural Journal, Vol.(92), pp. 718-721.
– Sposito, G. (1989). The chemistry of soils.Oxford Univ. Press, Inc, New York.Pp. 211.
– Stevenson, F.J. (1994). Humus Chemistry: Genesis, Composition, Reactions. John Wiley & Sons, New York.
– Tomati, U.; E. Galli; A. Grappelli and G. Dihena. (1990). Effect of earthworm casts on protein synthesis in radish (*Raphanussativum*) and lettuce (*Lactuca sativa*) seedlings. Biol. fert. Soil, 9: 288-289.
– Vaughan D., Linehan D.J.(1976): The growth of wheat plants in humic acid solutions under axenic condi-tions. Plant and Soil, 44: 445–449.

کارتیکرنا خەمیرا هەڤیری و ترشی هیومیکی ل سەر شینبوون و بەرهەم ئینان و کوالیتیا رووکێ باقلی (**ViciaFabaL.**)

پوختە

ئەف ڤەکولینە هاتیە بجهئینان د وەرزێ پاییزێ دە سالا **2017-2018**دە ل کولیژا جاندنێ دە زانکویا دهوك ,هەریما کوردستانا عیراقێ. بودیارکرنا کارتێکرنا بەرمایکن خەمیرا هەڤیری بسێ ریژا **(0, 2 و 4** گرام بو هەر لیترەکێ**)** وترشی هیومیکی ب دوو ریژا **(9 و 18** مب بو هەر لیترەکێ**)** ل سەر شینبوونا و وبەهەرم ئینان رووەکێ باقلێ **(ViciaFabaL.)** جوری نافخووی و ئەوی هاتی جاندن ل زەڤین جاندنێ. ئەنجاما دیارکرن کو ساخلەتین شینبوونێ و کوالیتیا فیقی ب شیووەیەکێ باش هاتن دیارکرن دما رشاندنا رووەکی ب **(18**مل بو هەر لیترەکێ **)** هەڤبەر کر دکەل رووەکن نەرەشاندی. کارئینانا **(9**مل هەر لیترەکێ**)** ژ ترشی هیویمکی بلند ترین بها ژ کلوروفیلی دا **(47**سپاد**)** و هەر واسا **46,33**سپاد**)** دما رەشاندی ب **(9**مل بو هەر لیترە کی **)**ژ هەڤیرترشی. زیدەبوونەکا بەرجاف دیاربوو دما رووەکێن رەشاندی ب **(18**مل بو هەر لیترەکێ**)**ژ ترشی هیومیکی د قەبارا بەلگی هاتەتومارکرن(**6,61**سم**)** و بلندترین ژمارا بەلگان **(900**بەلگ بو هەر رووەکەکێ**).**ڤەدیتنا مەزنترین ژمارا بەلگان بو هەر رووەکەکی دما هاتن رشاندن ب **(9**مل بوهەر لیترەکێ**)** دیاربوونا جیاوازیین واتایی دقەبارێن هەمی رووەکی **(**غم بوهەر رووەکەکی **)**دوان رووەکێن هاتینە رەشاندن ب **(18**مل بوهەر لیترەکی **)**ژترشی هیومیك افا **(1073,33** گم بوهەر رووکەکی **)**تومارکرنا جیاوازین واتای د دریژاهییا گریکا وهژمارا رووەکا ئەڤیت هاتینە رەشاندن ب**(18**ما بو هەر لیترەکی **)**ژترشا هیومیك افا هاتیە تومارکرن **(13,33**ملم **0,76 0,76%)**ب زنجیرەی درەشاندنا رووەکی ب **(18**مل بو هەر لیترەکی **)**ژترشی هیومیك هەڤبەرکرن دگەل رووەکێن نەهاتینە رەشاندن افا کو کیمترین ریژە ز سەرجاوەیین کانزایی رەشاندنا رووەکی ب **(4**گم بۆهەر لیترەکی **)**ژهەڤیرترشی نانی باندترین ریژا بەرهەمینانی ژسەرچاوا نایتروجینی **(1,88%)** هەڤبەرکرن ب کیمترین ریژە کوهات تومارکرن د کونترول.

تاثير مستخلص الخميرة وحامض الهيوميك علىصفات النمو والانتاج لمحصول الباقلاء ***(Vicia Faba .) L***

الخلاصة

اجريت هذه الدراسة خلال موسم النمو الخريفى**2017- 2018** في كلية الزراعة جامعة دهوك اقليم كوردستان العراق**,** لتقدير تاثير مستخلص خميرة الخبزبثلاث تراكيز **(0 ,2** و **4**غم لكل لتر**)** وحامض الهيوميك بتركيزين **(9** و **18**مل لكل لتر**)** على نمو النبات وانتاج محصول الباقلاء **(*Vicia faba L.*.)** الصنف المحلي المزروع فى الحقل **.**اظهرت النتائج بان صفات المجموع الخضري ونوعية الثمار والانتاج **.**للمعاملة ب **(18** مل **/** لتر**)** هيوميك اسيد تفوقت معنويا على بقية المعاملات ،افضل النتائج في محتوى الكلوروفيل **(SPAD47)** سجلت عند استخدام الهيوميك اسيد **(9** مل / لتر**).** سجلت زيادة معنوية في مساحة الورقة عند رش النبات **(18** مل **/** لتر**)** هيوميك اسيد الذي سجل **(26.66** سم**)**،اكبر عدد من الأوراق لكل نبات سجلت بمعاملة **(9** مل **/** لتر**)**الذي أعطت **(900** ورقة لكل نبات**.** الوزن الكلي للقرنة **(**غم **/** نبات**)** في النبات المعالج بـ **(18** مل **/** لتر**)** من حامض الهيوميك الذي أعطى **(1073.33** غم **/** نبات**).**أظهرت النتائج أيضًا اختلافًا كبيرًا في طول العقدة وعددها عند رش النباتات بـ **(18** مل **/** لتر**)** هيوميك اسيد الذي سجل اعلى النتائج **(13.33** ملم و **20** عقدة على شكل نبات**)** على التوالي أظهرت نتائج النتروجين، الفسفور والبوتاسيوم نسب مئوية عالية والتي كانت **(1.88** و **0.76** و **0.76٪)** على التوالي عند معالجة النبات **(18** مل **/** لتر**)** هيوميك اسيد ، مقارنة مع النبات غير المعالج مع حامض الهيوميك الذي أعطى نسبة مئوية أقل**.**