Effect of Mulching, Foliar application of Amino acid on the Growth and Yield od Cauliflower, *Brassica olerace* var *botrytis* L.

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Abstract

The experiment was conducted in one of the agricultural fields in the Al-Muqdadiya district of Diyala province in the season 2021-2022 to study the effect of soil mulching with transparent and black plastic as well as the control treatment without mulching and spraying with amino acids at two concentrations: 1 ml L-1 two sprays and four sprays and 2 ml L- 1 two and four sprays in addition to the control treatment and its effect on the quantitative and qualitative traits of White Snow F1 hybrid cauliflower. The results showed the excelled of the treatments of covering the soil with black plastic in the leaves content of N, P, K, weight of the curd, the total yield, the percentage of protein in the curd, the percentage of sulfur in the curd, as it gave 2.45 % ، 0.29 % ، 2.52%, 2.03 kg plant-1, 47.18 tons ha-1, 17.12%, 0.28% cm respectively. The results also showed a significantly excelled of spraying with a concentration of 2 m L-1 in two sprays in the leaves content of N, P, K, the weight of the curd, the percentage of protein in the curd, the percentage of protein in the curd, as it gave 2.51 % ، 0.29 % ، 2.61%, 1.99 kg plant-1, 37.12%, 0.30% cm, respectively. The results also showed that there were differences in the interactions between the two factors of the study. The interaction between soil mulching with black plastic and spraying with amino acids at a concentration of 2 ml L-1 with four sprays gave the highest values in the leaves content of N, P, K, the weight of the disc, the total yield, the percentage of protein in the curd, the percentage of protein in the curd, which gave 2.64 % ، 0.34 % ، 2.88%, 2.26 kg plant-1, 53.35 tons ha-1, 75. 12%, 0.37% cm, respectively.

Key words: Cauliflower, Soil mulching, Amino acids, Yield traits

Introduction :

Cauliflower and the scientific name is Brassica olerace varbotrytis L. It belongs to the Brassicaceae family and is one of the most important winter vegetable crops, including more than 350 genera and about 4000 species spread in different regions of the world. The original home is the Mediterranean basin, including the northern hemisphere's temperate regions. , The part eaten from the plant is curd which is the flower buds before they open with the flower stands and are used for cooking, salad or pickling. Each 100 g of cauliflower contains 91.7% water, 25 calories, 2.4 g protein and 4.9 g of substances. Carbohydrates and 72 mg phosphorous. It is also rich in vitamin A and C and a number of minerals such as calcium, iron and iodine. Plants grow well in cold and humid weather, and do not resist sharp drops in temperatures and frosts, and do not withstand high temperatures . It largely depends on the climate, especially the temperature and this relationship is very intense and complex. The suitable temperature for growth phases ranges from 20 ± 5 ° C and for curd growth and development is 15 ° C - 20 ° C. Cauliflower requires a period of cold not only to produce curd but also to flower However, The average cauliflower production in Bangladesh is very low compared to cauliflower in other developing countries in the world. This low yield is not indicative of the low productive capacity of the crop, but of the fact that the crop cultivar is low, poor crop management practices and lack of improved technologies. The yield of cauliflower depends on the cultivar, cultivation methods, climatic conditions, soil fertility, influencing factors,

etc. The right cultivar is needed for yearly continuous production . Mulching also plays an important role in organic farming and is used for many beneficial reasons in the agriculture sector such as soil temperature adjustment, weed control, soil conservation but water conservation and erosion control are the most important aim. in addition to , Mulching also adds essential plant nutrients to the soil after decomposition, which improves the soil's physical, chemical and biological properties and leads to an increase in crop quality and quantity (15). Therefore, the current studies were conducted to study the effect of different sources of nutrients with coverage on the growth and yield of cauliflower. There are many factors that affect the growth and productivity of horticultural crops, including cauliflower, and one of these factors is mulching, which is covering the surface of the soil with plastic or organic materials, which reduces the amount of water used for irrigation .It increases its efficiency, regulates soil temperature, reduces evaporation losses, eliminates jungles, increases yield, quality and cleanliness of fruits, and protects them from contact with the soil surface to avoid rotting (21). Ground cover also creates good conditions for vegetative growth, especially in sandy lands, to retain ground moisture, provide good ventilation and permeability for root growth and increase their spread, and protect the soil from rain. High winds and soil cover also prevent the loss of nitrogen volatilization from the soil, increase the carbon dioxide in it, reduce the incidence of soil-borne diseases and reduce soil salinity (7), (14).

Biostimulants are natural or artificial components used for seeds, plants, and soil (9). These substances cause differences in essential and structural functions, affecting plant growth through enhanced toleration to abiotic stresses and improving seed and/or grain yield and quality. In addition, biostimulants like amino acids decline the demand for fertilizers (8); (22).

One of the most important modern methods that are used to improve growth and productivity in plants is to spray amino acids on the leaves because they reduce the absorption of nitrates and their great role in raising the efficiency of metabolic processes and antioxidants by increasing the percentage of enzymes in plant tissues (6). Amino acids are involved in the manufacture of carbohydrates, Building protein and stimulating the photosynthesis process through its role in building chlorophyll and encouraging the work of many enzymes that are related to the control of the plant organism to harsh conditions and stresses and stimulate chemo-biological and physiological processes (26), (12) , (13), (1), (20) found that the addition of preparations containing amino acids (MAMMOT LAY-0), which consists of 20% amino acids and (Wt/Wt HUMIFERTLTRA) and consists of 12% amino acids with an interaction of the preparation READY MIX and consists of a mixture of elements The treatment of the mixture of the three preparations gave the highest rate in plant height, leaf area, dry weight of eggplant leaves and chlorophyll percentage. (2). showed that increasing the number of teas from the nutrient solution Murashige, Skoog (MS) and boron had a significant effect on the vegetative traits of the plant and the yield traits of the barley for the growing seasons 2011 and 2012. It gave the highest amount of yield, which amounted to 10.77 and 14.16 tons per hectare, which did not differ significantly with the treatment of spraying with three sprays, which produced 10.12 and 13.15 tons per hectare, which were significantly excelled on the control treatment, which produced 9.28 and 9.95 tons.ha^{-1} for both growing seasons, respectively. Spraying with two sprays also gave the highest percentage of protein in seeds, which amounted to 26.26 and 25.84%, compared to the control treatment, which gave the lowest percentage of protein, which amounted to 22.97 and 22.84%, respectively, for both growing seasons. Sulfur is famous for its role in activating enzymes and synthesising proteins, oils, vitamins, chlorophyll, glycosides and glucosinolate in plants. These sulfur compounds are glucosinolate (GLS), the

botanical defence receptors found in all cabbage plants. Depending on the GLS side chain, Three groups can be distinguished, namely aliphatic, indole and aromatic GLS, which are derived from various amino acid precursors during plant tissue disruption, GLS stored in vacuoles mix with myrosinase enzyme, which hydrolyzes GLS into several breakdown products, Depending on the side chain of GLS and the presence of specific proteins. The two main groups of GLS decomposition products are isothiocyanates and nitriles, which are toxic and harmful to herbivores. On the other hand, epidemiological studies have suggested that high consumption of vegetables belonging to Brassica can reduce the risk of cancer in humans, This is mainly due to the presence of GLS detailing products [4]. Isothiocyanates, the same important compounds in the plant's defense system, are potent inducers of phase II detoxification (27).

Materials and methods

The experiment was conducted in one of the agricultural fields in Al-Haruniya area in Muqdadiya district, 40 km northeast of Baquba for the autumn season 2021-2022.In order to study the effect of covering the soil and spraying with amino acids several sprays on the productive traits of the growth and yield of cauliflower. The white Snow F1 hybrid cauliflower seeds were planted on 6/9/2021. Peat moss was used as an agricultural medium, where one seed was placed in each slot of the plate and service operations were conducted on it until it was transferred to the field on 10/6/2021, and the harvesting process took place starting On 6/1/2021 and continued to 06/2/2022. The experiment included two factors, the first represented by covering the soil with transparent and black plastic sheets as well as the control treatment without covering and the second-factor spraying plants with fertilizer containing amino acids at concentrations (1, 2) ml L^{-1}, which was sprayed on plants two and four sprays for the two concentrations used in addition to the control treatment without spray. So that we have 15 experimental units in one replicate, and the total number of experimental units is 45 experimental units, which is an overlap of amino acid concentrations and the number of sprayer with coverage treatments . The experiment was designed as a factorial experiment within a randomized complete block design (RCBD). The data were analyzed using the (SAS., 2001) program and the averages were compared using Duncan's polynomial test at a probability level of 0.05 (Al-Rawi and Khalaf Allah, 2000) Studied traits:

1- The percentage of nitrogen in the leaves: The percentage of nitrogen in the leaves was estimated by taking 5 sheets of full-width leaves from each experimental unit and dried in an electric oven at 65º C for 72 hours until the weight was stable (Al-Sahhaf, 1989), then crushed and 0.2 g of The crushed sample and the samples were digested by adding 4 ml of concentrated sulfuric acid and 2 ml of concentrated pyrochloric acid. Nitrogen was measured using a Micro Kjeldahl device according to the method mentioned in (Jackson, 1958).

2- Percentage of phosphorous in the leaves: the total phosphorus was estimated as in the above digestion method using ammonium molybdate and it was measured using a spectrophotometer at a wavelength of 882 nm according to the method mentioned in Page (1982).

3- Percentage of potassium in the leaves: Potassium was estimated by the above-mentioned digestion method, then measured by a flame photometer, according to the method proposed by (Haynes, 1980).

4- Weight of curd (kg $plant^{-1}$): The curd weight was calculated for five randomly selected plants from each experimental unit and then according to its average.

5- Total yield (ton ha^{-1}): The total yield was calculated by calculating the yield of each

experimental unit and then due to the hectare according to the equation:

Total yield (ton ha^{-1}) = (yield of the experimental unit / area of the experimental unit) * 10000 (area of hectares).

6- Percentage of protein in fruits (%): The protein value was calculated by estimating the nitrogen percentage in fruits as in the previously described method, by Kjeldahl's method, and multiplied by a value of 6.25. Protein (%) = Nitrogen (%) * 6.25.

7- The percentage of sulfur in the fruits: We take (0.2) g of the sample from the curd and add to it a mixture consisting of nitric acid and perchloric acid in proportions (4:9) volume/volume and heat the mixture gradually until the appearance of a red foam of NO_2.The solution begins to boil until the volume of the solution reaches 3-5 ml, and the solution turns into a colorless clear, cools, and completes the volume to 50 ml with distilled water. A spectrophotometer estimates the sulfur at a wavelength of 420 nm, and the sulfur concentration is extracted from the standard curve of Hammed et al. (2002).

Table 1 indicates that there are significant differences with regard to soil covering treatments . The black plastic covering treatment was significantly excelled , where it gave the highest percentage of nitrogen in the leaves, which amounted to 2.45%, compared to the control treatment, which gave the lowest percentage of it, which amounted to 1.95%.With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} and four sprays significantly excelled on the rest of the treatments, giving the highest percentage of 2.51% compared to the control treatment, which gave the lowest percentage of 1.91%.The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significantly excelled, where the treatment of covering soil with black plastic and spraying with amino acids at a concentration of 2 ml L^{-1} and with four sprays was significantly excelled on the rest of the treatments as it gave the highest percentage of 2.64% compared to the control treatment that gave the lowest The damage rate was 1.85%.

Results and discussion :

The percentage of nitrogen in the leaves:

Table 1: The effect of soil coverage and spraying with amino acids and the interaction between them on the percentage of nitrogen in the leaves

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	1.79 f	1.85 ef	1.89 ef	1.91 ef	2.33 c	1.95 C
clear plastic	1.86 ef	2.01 de	2.34 c	2.51 ab	2.57 ab	2.26 B
black plastic	2.09 d	2.42 bc	2.53 ab	2.57 ab	2.64 a	2.45 A
averages of amino acids	1.91 D	2.09 C	2.25 B	2.33 B	2.51 A	

*Values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 probability level.

The percentage of phosphorous in the leaves

Table 2 indicates that there are significant differences with respect to soil covering treatments . The black plastic covering treatment was significantly excelled, where it gave the highest percentage of phosphorous in leaves, which amounted to 0.29%, compared to the control treatment, which gave the lowest percentage of it, which amounted to 0.21%. With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} and four sprays significantly excelled on the rest of the treatments, as it gave the highest percentage of 0.29% compared to the control treatment, which gave the lowest percentage of 0.20%.The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significant superiority, as the treatment of soil coverage with black plastic and spraying with amino acids at a concentration of 2 ml L-1 in two sprays and four sprays were significantly superior to the rest of the treatments, giving the highest percentage of 0.32% and 0.34%, respectively, compared to With the control treatment, which gave the lowest percentage, as it reached 0.19%.

Table 2 Effect of soil coverage and spraying with amino acids and the interaction between them on the percentage of phosphorous in leaves

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	0.19 g	0.19 g	0.20 fg	0.22 ef	0.24 de	0.21 C
clear plastic	0.20 fg	0.25 cd	0.27 bc	0.28 b	0.29 b	0.26 B
black plastic	0.23 de	0.25 cd	0.29 b	0.32 a	0.34 a	0.29 A
averages of amino acids	0.20 E	0.23 D	0.25 C	0.27 B	0.29 A	

The values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 . probability level

The percentage of potassium in the leaves

Table 3 indicates that there are significant differences with regard to soil covering treatments . The black mulching mulching treatment was significantly excelled , where it gave the highest percentage of potassium in the leaves, which amounted to 2.52% compared to the control treatment, which gave the lowest percentage of it, which amounted to 2.11%.With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} and four sprays significantly excelled on the rest of the treatments, giving the highest percentage of 2.61% compared to the control treatment, which gave the lowest percentage of 2.01%.The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significant superiority, as the treatment of soil coverage with black plastic and spraying with amino acids at a concentration of 2 ml L^{-1} in two sprays and four sprays were significantly superior to the rest of the treatments, giving the highest percentage of 2.74% and 2.88%,

respectively. Compared to the control treatment, which gave the lowest percentage, reaching 1.94%.

Table 3 The effect of soil coverage and spraying with amino acids and the interaction between them on the percentage of potassium in the leaves

Soil mulching	amino acids					soil Mulching averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
Without mulching	1.76 g	1.94 f	2.15 de	2.27 cd	2.41 bc	2.11 C
Transparent mulching	2.07 ef	2.21 de	2.43 bc	2.52 b	2.54 b	2.35 B
Black Mulching	2.21 de	2.23 de	2.52 b	2.74 a	2.88 a	2.52 A
averages of amino acids	2.01 E	2.12 D	2.36 C	2.51 B	2.61 A	

*Values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 probability level

Discuss the results of nutrients in the leaves

The results indicate the significantly excelled of soil coverage in increasing the leaf content of nutrients (Tables 1, 2 and 3)This may be due to the fact that covering the soil preserves moisture and thus increases the availability of nutrients from nitrogen, phosphorous and potassium, especially when using black plastic covering, which has increased the readiness of nitrates, ammonium, phosphorous and plants, thus making the pH neutral and reducing the electrical conductivity and thus increasing their absorption by the plant and its accumulation in plant leaves and these results are consistent with what was stated by (20) . Or it may explain the reason for this increase with the use of soil covers to raise the temperature of the soil and this leads to an increase in the growth of the root system and an increase in its activity in absorbing water and nutrients in the soil, including nitrogen, phosphorous and potassium, and thus increasing its accumulation in the leaves of the plant (4). The results also indicate the moral superiority of amino acids in increasing the content of nutrients in leaves (Tables 1, 2 and 3). The reason for this may be due to the fact that the amino nutrient consists of a large number of amino acids that work to increase vegetative growth and increase the accumulation of nutrients in The reason for the increase may be due to the main role of amino acids in building enzymes for photosynthesis, As well as its role in supplying the plant with nitrogen, which participates in the construction of proteins, vitamins and alkaloids. who found that foliar feeding with amino acids works to increase the content of the leaves of nutrients and these results It agrees with what was mentioned by (3) and (5) as well.

Curd Weight (one plant yield) (kg plant^{-1})

Table 4 indicates that there were significant differences regarding soil mulching treatments. The black plastic mulching treatment was significantly excelled, where it produced more curd, weighing 2.03 kg plant^{-1}, compared to the control treatment, which

produced less curd, which weighed 1.77 kg plant^{-1}.With regard to the treatments of spraying with amino acids, the spraying treatment with a concentration of 2 ml L^{-1} and four sprays significantly excelled on the rest of the treatments as it produced more pink tablets with a weight of 1.99 kg plant^{-1}compared to the control treatment significantly, which produced less curd with a weight of 1.57 kg plant^{-1}.

Table 4 The effect of soil coverage and spraying with amino acids and the interaction between them on the curd weight (kg plant-1)

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	1.36 h	1.45 gh	1.57 fgh	1.61 efg	1.83 cde	1.56 C
clear plastic	1.58 fgh	1.74 def	1.78 def	1.86 cd	1.89 cd	1.77 B
black plastic	1.77 def	1.91 cd	2.19 ab	2.02 bc	2.26 a	2.03 A
averages of amino acids	1.57 D	1.70 C	1.85 B	1.83 B	1.99 A	

The values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 . probability level

The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significantly excelled, where the treatment of covering soil with black plastic and spraying with amino acids at a concentration of 2 ml L^{-1} and with four sprays was significantly excelled on the rest of the treatments as it gave 2.26 kg plant^{-1} compared to the control treatment that produced curd less weight as it reached 1.36 kg plant$^{-1.}$

Total yield (tons ha^{-1})

Table 5 indicates that there are significant differences with regard to soil covering treatments. The black plastic covering treatment was significantly excelled, where it produced the highest amount of the total yield amounting to 47.18 tons ha^{-1}compared to the control treatment which produced the lowest volume yield, which amounted to 36.08 tons ha^{-1}.With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} by two and four sprays significantly excelled on the rest of the treatments. They produced the highest yield of 45.73 and 44.71 tons ha^{-1}, respectively, compared to the control treatment, which produced the lowest yield, which amounted to 35.40 tons ha^{-1}.The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significantly excelled , where the treatment of covering soil with black plastic and spraying with amino acids at a concentration of 1 with four sprays and 2 ml L^{-1} sprays and four sprays were significantly excelled on the rest of the treatments, which gave 53.35, 51.00 and 48.54 tons ha^{-1}compared to the control treatment that produced the lowest yield as it reached 30.73 tons ha^{-1}

Table 5: The effect of soil coverage and spraying with amino acids and the interaction between them on the total yield (tons ha^{-1})

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	30.75 d	32.77 d	35.32 cd	40.37 bc	41.17 bc	36.08 C
clear plastic	35.55 cd	39.30 bc	40.20 bc	42.77 b	42.67 b	40.10 B
black plastic	39.90 bc	43.12 b	48.54 a	51.00 a	53.35 a	47.18 A
averages of amino acids	35.40 C	38.40 BC	41.35 B	44.71 A	45.73 A	

*Values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 probability level

Protein content in curd

Table . 5 indicates that there are significant differences with respect to soil covering treatments. The black plastic covering treatment was significantly excelled , where it gave the highest percentage of protein in curd, which amounted to 12.17%, compared to the control treatment, which gave the lowest percentage of it amounted to 11.63%.With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} and with four sprays significantly excelled on the rest of the treatments. It gave the highest rate of 12.37% compared to the control treatment, which gave the lowest rate of 11.50%The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significantly excelled , where the treatment of covering the soil with black plastic and spraying with amino acids at a concentration of 2 ml L-1 and with four sprays was significantly excelled on the rest of the treatments as it gave the highest percentage of 12.75% compared to the comparison treatment that gave the lowest The percentage amounted to 11.39%.

Table 6: The effect of soil coverage and spraying with amino acids and the interaction between them on the percentage of protein in curd

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	11.39 g	1.83 fg	11.54 efg	11.73 defg	12.06 bcd	11.63 C
clear plastic	11.48 fg	11.66 defg	11.81 cdef	12.06 bcd	12.31 b	11.86 B
black plastic	11.62 defg	11.94 bcde	12.21 bc	12.33 b	12.75 a	12.17 A
averages of amino acids	11.50 D	11.68 CD	11.85 BC	12.04 B	12.37 A	

*Values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 probability level

Sulfur content in curd

Table 7 indicates that there are significant differences with respect to soil covering treatments. The black plastic covering treatment was significantly excelled, where it gave the highest percentage of sulfur in curd, which amounted to 0.28%, compared to the control treatment, which gave the lowest percentage of 0.18%.With regard to the amino acid spray treatments, the spraying treatment with a concentration of 2 ml L^{-1} and four sprays significantly excelled on the rest of the treatments as it gave the highest percentage of 0.30% compared to the control treatment which gave the lowest percentage of 0.15%.The results of the same table showed that the interaction between soil coverage and spraying with amino acids caused a significantly excelled, where the treatment of soil coverage with black plastic and spraying with amino acids at a concentration of 2 ml L-1 and with four sprays was significantly superior to the rest of the treatments as it gave the highest percentage of 0.37 % sequentially compared to the control treatment that gave The lowest percentage was 0.13%.

Table 7: The effect of soil coverage and spraying with amino acids and the interaction between them on the percentage of sulfur in curd

soil covering	amino acids					soil covering averages
	control	Spray at a concentration (1 ml L-1) two sprays	Spray at a concentration (1 ml L-1) four sprays	Spray at a concentration (2 ml L-1) two sprays	Spray at a concentration (2 ml L-1) four sprays	
without cover	0.13 h	0.15 gh	0.16 gh	0.23 ef	0.25 de	0.18 C
clear plastic	0.15 gh	0.18 g	0.22 ef	0.25 de	0.28 cd	0.21 B
black plastic	0.18 g	0.26 cde	0.29 c	0.32 b	0.37 a	0.28 A
averages of amino acids	0.15 E	0.19 D	0.22 C	0.26 B	0.30 A	

*Values that share the same letters are not significantly different from each other according to Duncan's polynomial test at the 0.05 probability level

discussion of the results of traits of the result

Tables (4, 5, 6 and 7) show that soil coverage, especially the soil covered with black plastic, is a significantly excelled in all studied yield indicators.As it led to an increase in the curd weight, the total yield, the percentage of protein in the curd, and the percentage of sulfur in them, which may explain the reason for the increase in the increase in the content of the leaves of the nutrients nitrogen, phosphorous and potassium,or the reason for the increase is due to the effect of mulching by raising the temperature of the soil, which leads to an increase in root growth and in turn leads to an increase in its activity in absorbing water and nutrients in the soil, which is reflected in an increase in root and vegetative growth, stimulating the growing tops, the production of plant hormones, including auxins and gibberellins, and thus an increase in the characteristics of Vegetative growth, which in turn leads to an increase in yield traits due to the accumulation of nutrients in the leaves, which encouraged an increase in vegetative traits, which was reflected in an increase in yield traits. Also, covering the soil has an effect on the lack of evaporation from the

surface of the soil, which reduces the rise of water to the top by capillary action and thus prevents the accumulation of salts in the root area, and the increase in the moisture stock of the root zone due to coverage It may cause a decrease in the salt concentration in the surface layer of the soil and thus give an opportunity for growth, division and elongation of cells and in turn positively reflects on improving the traits of vegetative growth and thus affecting the increase in yield traits. This is what (18) mentioned when studying the effect of soil coverage on the concentration of saline solution, the results achieved from improving vegetative growth characteristics were consistent with the results of many researchers who reached a significant increase in vegetative growth traits and consequently improving yield traits for different plants, including (23), (25) .Tables (4, 5, 6 and 7) also showed that spraying cauliflower plants with amino acids had a significant effect on an increase in all studied yield indicators, as it led to an increase in the weight of curd, the total yield and the percentage of protein in curd and the percentage of sulfur in it may explain the reason for the increase in the increase in the content of the leaves of the nutrients nitrogen, phosphorous and potassium, which led to its effect on encouraging vegetative traits. These results are in line with what was found by (11) when tryptophan and methionine were added to red lactobacillus and (5) when glutamine acid was added to carrot plant and (28) when glutamine acid was used at concentrations (0, 25 and 50) mg L^{-1} on green beans .As the plant length increased as a result of these treatments. when they treated tomato with a combination of amino acids (14 amino acids) spraying on the vegetative system, as well as (24) when they used a group of amino acids sprinkled on the vegetative group of cucumber .The results of this study also agreed with (14) whereas spraying amino acids improved vegetative and qualitative traits of moringa seedlings and (3) when sprayed Balticamine on the potato plant.

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