Effect of addition Humic acid and sprying of Tecamin max on growth and yield of (Pisum sativum L.)

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Abstract. This study was conducted in vegetable field of Hort. Dep. /college of Agric. and forestry / Mosul University to evaluate the effect of Humic acid and Tecamin max on growth, seeds and pod yield of green pisum. Study consist of seven treatments as follow: control, 4 and 6 g.l⁻¹ Humic acid, 3 and 6 ml.l⁻¹ Tecamin max, mixture of 2 g.l⁻¹ Humic acid +1.5 ml.l⁻¹ Tecamin max and mixture of 3 g.l⁻¹ + 3 ml.l⁻¹ Tecamin max. The treatment were applied at 3 dosages, the first applied after 40 days from planting and the second after 70 days and third after 100 days of planting. Randomized complete block design were used with 3 replicates. The important results were as follow:

1. Most of organic fertilization treatments were superior on control treatment in all vegetative growth and green yield parameters.

2. Mixture treatment of 3 g.l⁻¹ Humic acid + 3 ml.l⁻¹ of Tecamin max was the best treatment as compared with other organic fertilization treatments, which gave the highest values in most of vegetative growth, yield, green seed and biological yield.

3. Addition of Humic acid treatments gave the best results as compared with Tecamin max, addition 4 g.l of Humic acid was superior treatment as compared with others treatment.

Key words: Peas, Humic acid, Tecamin max, Yield.

Introduction

Prepare Peas (pisum Sativum L.) is one of the plants of the Fabaceae Family which is second in economic importance after the family graminaceae and prepare it is on of the annual herbaceous plants limited or unlimited growth and adapted to wet climatic conditions. Peas are grown for fresh green seeds, dry seeds and sugary pods or green plant parts (Davies, 1985 and Boras, 1992). Peas are vegetables that are very rich in protein, Carbohydrates and nutrients (Watt and Merrerill, 1963, and Hassan, 2002). From the agricultural point of view, the pea crop plays an important role in the agricultural cycle, as it is one of the crops that nitrogen fixing in the soil (Davies, 1985).

The world turned to the use of organic matter of animal or plant origin as a fertilizer source for the purpose of reducing pollution of the environment and agricultural soils in chemicals and the production of agricultural corps safe for humans, animals and compensation of organic matter, which is lost from the soil as a result of intensive agriculture and the use of high-yielding varieties. Humic acid
is considered one of the organic fertilizers that contains many nutrients and substances that improve soil fertility, which is reflected on increased vegetative growth, and plants yield (Ching, 1977). Gad El-Hak and et al.,(2012) sprayed pea plants “master” variety, which 2 g.l⁻¹ of Humic acid resulted in a significantly exceeded in most characteristics of as compared with increase control plants. El-Najar et al. (2013) found significant superiority for the treatment of the addition of Humic of 2 g.L⁻¹ conc. to pea plants “Master B” variety on the control in most vegetable and yield characteristics. Al-Saleem (2017) found that, treated the pea plants with Humic acid of 2 g.l⁻¹ conc. significant increase in all characteristics of growth, yield and its components as compared with control treatment.

Amino acids have a positive effects on many physiological and biological process within plant, as well as the need for plants for these amino acids for continued growth and production (Hounsome et al., 2008). Amino acids are considered of the modern technologies that are used to sprinkle on the plant and which provide the agricultural production in required (cerdana et al., 2009). Ibrahim et al (2009) mentioned that, amino acids helps plants to respond physiological environmental conditions, in addition to their role in stimulating the work and construction of many organic compounds. Manusheve et al., (2016) observed that, spraying of the nutrient solution Tecamin Max to the pepper plants at a concentration of 2 L. Ha⁻¹ resulted to a significant increase in characteristics of dry matter ration of the fruit, weight of the fruit, total yield of hectare and the least period to give the first fruit on the plant. Al-Hamdani et al. (2017) found that spraying Tecamine solution on the potato plants at a concentration of 2 L.ha⁻¹ led to a significant increase in characteristics (plant length, number of plant stems, leaf content of total chlorophyll and the area of the single leaf) compared to the non-spray treatment.

**Material and Methods**

This experiment was carried out in the vegetable fields of the department of horticulture and Landscape dept. College of Agriculture and Forestry, university of Mosul, Iraq, during agricultural season 2017/2018, to study the addition effect of the Humic acid and spraying of nutrient solution (Tecamin Max) on vegetative growth characteristics and yield of pea plant, the experiment included seven treatment and represented by control (without addition), add the Humic acid to the soil at a concentration of 4 and 6 g.L⁻¹, spray the nutrient solution ticamin max on the plants with a concentration of 3 and 6 ml.l⁻¹, mixture the addition of Humic acid to soil 2 g.L⁻¹ + spraying the Tecamin max solution on plant 1.5 ml.l⁻¹, mixture the addition of Humic acid to soil 3 g.L⁻¹. Treatments were represented by the following symbols (T0, T1, T2, T3, T4, T5 and T6). Add the humic acid to the soil and spray the plants with the nutritive solution of the Tecamin max in the form of three batches, the first after 40 days and the second after 70 days and the third batch after 100 days of planting.

The soil of the experiment was plowed, smoothed and subdivided into rows, and the plants were planted in the center of the row at a distance of 30 cm between the plant and the other, drip irrigation and black polythene cover were for all rows in the treatment, thus reaching one experimental area 1.5m² and planting seeds of pea plants on 28/11//2017. Random sampling of field soil before planting and from different depths were taken to determine the chemical and physical characteristics in the central laboratory in of Agriculture and Forestry collage -University of Mosul (Table 1).

| Table (1) some chemical and physical characters of soil |
|---------------------|------------|------------|------------|------------|-----------------|-----------------|
| pH | EC | N | P | K | Soil separators(g/Kg) | Soil tissue |
| 7.3 | 0.491 | 19.5 | 2.4 | 6 | Clay | Silt | Sand |
| 439. | 55 | 505. | 5 | 5 |

The experiment was carried out according to the randomized complete blocks design (R.C.B.D), with three replicates. A comparison was made between the averages according to the least significant difference at 0.05 (Al-Rawi and Abdul Aziz 2000), to evaluate the growth and yield of pea plant, the
following characteristics were estimated: plant length cm, number of branches. Plant\(^1\), number of leaves. Plant\(^1\), leaf area (cm\(^2\)), total leaves area. Plant\(^1\) (cm\(^2\)), total chlorophyll ratio, average weight of soft plant\(^1\) (gm), average dry weight. Plant\(^1\) (gm), dry matter ratio of plant, average number pods. Plant\(^1\) pod diameter (mm), length of pod (cm), number of seeds.pod\(^1\), green pod (gm), average weight of 100 seeds (gm), the date of the first flower on a plant, early yield of green pods. Plant\(^1\), total yield of green pods. Plant\(^1\) (gm), yield of green seeds. Plant\(^1\) (gm), yield of green seeds.hectare \(^{-1}\) (ton), biological yield. Plant\(^1\) (gm) and T.S.S.

### Table (2): compounds of fertilizer used in experiment

| potassium K\(_2\)O Production company Humintech.com Germany | WSG85POWHUMUS analysis humci acid | WSG85POWHUMUS hummingdom | WSG85POWHUMUS % 12 % | WSG85POWHUMUS % 15 % | WSG85POWHUMUS % 85 % | WSG85POWHUMUS % 85 % | WSG85POWHUMUS % 85 % | WSG85POWHUMUS % 85 % | WSG85POWHUMUS % 85 % | WSG85POWHUMUS % 85 % |
|---------------------------------------------------------------|----------------------------------|----------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Total A. Acid % and Total A. Acid % Free amino acid from plant source by Spanish company Agri Tecno | Total A. Acid % and Total A. Acid % Free amino acid from plant source by Spanish company Agri Tecno | Total A. Acid % and Total A. Acid % Free amino acid from plant source by Spanish company Agri Tecno | Total A. Acid % and Total A. Acid % Free amino acid from plant source by Spanish company Agri Tecno | Total A. Acid % and Total A. Acid % Free amino acid from plant source by Spanish company Agri Tecno |
| **Humic acid** | **Other complete** | **humci** | **humci** | **humci** | **humci** | **humci** | **humci** | **humci** | **humci** | **humci** |
| **% 12** | **% 85** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** | **% 99.8** |
| **Production company** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** | **Humintech.com Germany** |
| **% 15** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** | **% 1** |
| **Type of amino acids in Tecamin max** | **Type of amino acids in Tecamin max** | **Type of amino acids in Tecamin max** | **Type of amino acids in Tecamin max** | **Type of amino acids in Tecamin max** |
| **N percentage 9.5** | **Isoleucine , Leucine ,Methionine , Fenilalanine, Trytotofan, Tirosino, Valine, Cisteine, Glicine, Proline, Arginine, Histidine, Ac. Glutamic, Ac. Aspartic, Asparagine, Glutamine, Serine, Threonine, Alanine, Lysine.** | **Isoleucine , Leucine ,Methionine , Fenilalanine, Trytotofan, Tirosino, Valine, Cisteine, Glicine, Proline, Arginine, Histidine, Ac. Glutamic, Ac. Aspartic, Asparagine, Glutamine, Serine, Threonine, Alanine, Lysine.** | **Isoleucine , Leucine ,Methionine , Fenilalanine, Trytotofan, Tirosino, Valine, Cisteine, Glicine, Proline, Arginine, Histidine, Ac. Glutamic, Ac. Aspartic, Asparagine, Glutamine, Serine, Threonine, Alanine, Lysine.** | **Isoleucine , Leucine ,Methionine , Fenilalanine, Trytotofan, Tirosino, Valine, Cisteine, Glicine, Proline, Arginine, Histidine, Ac. Glutamic, Ac. Aspartic, Asparagine, Glutamine, Serine, Threonine, Alanine, Lysine.** |

### Results and discussion

1- **Effect of the Humic acid, Tecamin max and mixing them in the growth characteristics of green peas.**

Data in table (3) showed that application of treatment 6 (addition of Humic acid to the soil at 3 g.l\(^{-1}\) + spraying plants with 3ml.L\(^{-1}\) of al Tecamin max.) led to a significant increase in all vegetative growth parameters under study except leaves dry weight percentage as compared with control treatment, and the values of these parameters are: 83.38cm, 6.11, 74.16, 26.48cm\(^2\), 1954.65cm\(^2\), 44.71%, 112.66g. and 26.37g.) for plant length, No. of branch. Plant, No. of leaves. Plant, leaf area, total leaves area, chlorophyll percentage, plant fresh and dry weight respectively. As well as, all other treatments (T1, T2, T3, T4 and T5) caused a significant increase studied vegetative parameters. Except T1 in leaf area and T3 and T4 in the percentage of chlorophyll comparing with control treatment. Also data in table 3 indicate a positive effect of application Humic acid to the soil and spraying plants by nutrient solution of the Tecamin max which caused a significant increase in vegetative parameters of green pea plants, although used as individual or as mixed treatment comparing with control treatment. The highest values in plant length (83.38cm, leaf area 26.48cm\(^2\), total leaves area 1954.65cm\(^2\), fresh plant weight 112.66g. and plant dry weight 26.37g.) were obtained by application treatment no.6. when the highest values in no. of branch per plant 7.06 and no. of leaves per plant 79.08 recorded in plants treated with treatment no.1., and the highest percentage of chlorophyll 46.61% recorded by application treatment no. 5.
Table (3) Effect of Humic acid and spray of the Tecamin max and mixed treatment in the vegetative growth parameters of green pea plants.

| Treatment | Plant length cm | N. of branches Plant⁻¹ | N. of leaves Plant⁻¹ | Total leaves area Plant⁻¹ (cm²) | Chlorophyll percentage % | Average weight of soft plant⁻¹ (gm) | Averag e dry weight Plant⁻¹ (gm) | Dry matter ratio of leaf |
|-----------|-----------------|------------------------|----------------------|---------------------------------|--------------------------|-----------------------------------|---------------------------------|-------------------------|
| T0        | 60.33           | 4.20                   | 50.22                | 19.4                            | 979.62                   | 36.86                             | 65.45                           | 12.79                   | 19.52                   |
| T1        | 73.40           | 7.06                   | 79.08                | 20.7                            | 1640.1                   | 42.45                             | 109.75                          | 26.34                   | 24.20                   |
| T2        | 74.61           | 5.20                   | 64.77                | 21.3                            | 1382.9                   | 46.06                             | 86.59                           | 20.24                   | 23.46                   |
| T3        | 69.72           | 6.08                   | 67.89                | 25.0                            | 1707.2                   | 38.61                             | 91.25                           | 18.07                   | 19.83                   |
| T4        | 64.28           | 5.07                   | 62.77                | 23.7                            | 1488.7                   | 40.12                             | 82.21                           | 18.98                   | 22.92                   |
| T5        | 74.06           | 6.55                   | 61.66                | 24.2                            | 1493.8                   | 46.61                             | 93.27                           | 19.62                   | 21.00                   |
| T6        | 83.38           | 6.11                   | 74.16a               | 26.4                            | 1954.6                   | 44.71                             | 112.66                          | 26.37                   | 23.65                   |

The superior effect of mixed treatment between adding Humic acid at 3g.L⁻¹ conc. to the soil and spraying plant with Tecamin max at 3 mL.L⁻¹ (T6) in the most vegetative parameters may be return to mixing organic fertilizers with these two concentrations may have given a suitable fertilizer composition for the growth of pea plants and may be due to the direct effect of the organic fertilizers contains nutrients and organic compounds (table2) promoted the increased growth of pea plants.

In addition to the effect of humic acid in the improvement of soil physical and chemical characteristics, which reflected on the increase of the total root plant (Field watch) resulting in increased absorption of nutrients from the soil. Found Utuk al et (2000) the addition of humic acid to the soil increased the readiness of the nutrients that can be absorbed by the plant because of the low PH soil by the effect of the humic acide, which reflects the effect of the increase of the length. Plant⁻¹ and area. Leaf⁻¹.

The superiority of these two characteristics may be due to the increased absorption of nutrients by the plant reflected on the increase of structural process within the plant to produce various organic compounds, inducing hormonal compounds that cause the increase of longitudinal division of the cell and increase in size, causing the increase of plant length and leaf are plant one (table3). Pointed out Anonomous (1998).

Humic acid works to improve plant growth directly or indirectly, it acts as a catalyst for the revitalization of plant hormones and encourages the release of different types of oxinates. The increase in the paper area of plants with this treatment way be due to the increase in the number of plant leaves and the area of the paper plant (table 3).

The reason for increasing in chlorophyll percentage in the leaves is roably due to increase in the absorption of nutrients through soil or spray increased the production of compounds necessary for the production of chloroplast responsible for the proportion of chlorophyll in the plant (table 3). Dekock
(1955) and Utuk et al (2000) reported that the addition of humic acid to the soil increased the availability of both Fe and P elements to be easily absorbed by the plant, which was reflected in increased production of protein compounds, which increased the plant content of chlorophyll. Either the fresh weight of the plant (table 3) it may be due to the increase of the plant components represented by the length of the plant, the number of branches and leaves and the total leaves area of the plant (table 3).

For the dry weight of the plant and percentage dry matter in leaves by this treatment (table 3), it may be due to the fact that the abundance nutrients and various compounds produced from the process of mixing the fertilizers (table 2), which led to an increase in the vegetative growth of plant, which finally reflected in these two characteristics (Table 3).

The superiority of treatment (T1) in the number of branches, Plant−1 (table 3) may be due to the fact that the humic acid has encouraged the increase of the absorption of nutrients from the soil in addition to its role as a chemical intermediary in the process of breathing plant all this reflected on the increase of enzymatic and the hormone in the plant, which increase the activity of the process of cell division and large size of the plant causing the formation of new parts of plants such as branches. Seen and Kingman (1998) pointed out in the early stages of plant development, humic acid is incorporated as a source of supplementation of multiple phenols that act as a chemical intermediary in the breathing process, which affects the efficiency of the enzymatic and hormonal stem. Increasing the number of leaves, Plant−1 by T1 may be due to the increase length and number of plant branches (table 3). These results are consistent with the findings of both Abbas (2013) on the broad plant and Al-Saleem (2017) on the Pea plant.

2- Effect of the Humic acid and the Tecamin max and their mixture in the yield components of the green peas.

The results of Table in (4) showed that application of T6 caused recorded the highest values in most these parameters pod length 8.07 cm, number of seeds. Pod−1 6.14, weight green.pod−1 6.16g and the weight of 100 green seeds 45.92g. the treatment (T6) also significantly superior on two treatments (T1, T5). In the pod length and significantly higher than the treatment (T2) in both traits pod length and number of seeds.pod−1 and significantly exceeded the treatment (T6) on the treatment (T3) in the parameters of length and diameter pod, number seed, pod−1, weight of the green pod and the weight 100 green seed percentage of increase meant to 5.07, 21.56, 11.89, 14.12 and 13.39% respectively.

Meanwhile, (T4) superior in the characteristic the of number of pods. Plant−1, length.pod−1, number of seeds.pod−1, number of seeds.pod−1, green pod weight and weight 100 green seed when, the (T6) significantly exceeded the treatment (T0) in the characteristics of the number of pods. Plant−1, length.pod−1, diameter. Pod−1, number of seeds.pod−1, green pod weight and weight 100 green seed.

Results (Table 4) The mixing treatment between 2g.l−1 Humic aci on the soil + spray 1.5 mi l−1 Tecamine max gave the value of pod diameter 12.52 mm and significantly exceeded most which differ significantly with treatments (Table 4) other (T0) recorded the lowest values for all studied parameters (Table 4).

The superiority of mixing treatment 3g.l−1 of Humic acid + 3 m.l−1 Tecamin max in most parameters components of yield components (Table 4), it may be due to the superior of this treatment in most traits of vegetative growth (Table 3) which has been reflected in the increase of structural processes within the plant, possibly leading to an increase in organic compounds, of which the hormones that cause increased cell division with large size led to increase the length of the pod, or that increase in these traits may be due to the direct effect of this fertilizers on its entry as an active hormone and enzymes because of the nature of protein synthesis (Table 2) which is a necessary component that
increases the softness of the walls of cellular membranes and their permeability and accumulation of building materials on the walls of plant cells such as cellulose, Seen and kingman (1998).

The increase in the number of seeds in pod may be due to the increase in the proportion of fertilized ova by increased pollen activity and the decrease in the number of seeds lost, this may be due to the abundance of processed foods within the plant due to the large vegetative growth of treated plants T6 (Table 3). The increase in the weight of the pod is probably due to the increase in the length and diameter of pod and the number of seeds of pod (Table 4).

### Table (4) Effect of Humic acid and spray of Tecamin max and mixed treatments in the yield components parameters for green pea.

| Treatment | Av. N.of pods/ plant | Pod Av. diameter | Av. Pod length | Av. N. of seeds/pod | Av. green pod | Av. weight of 100 seeds |
|-----------|----------------------|-----------------|----------------|---------------------|----------------|------------------------|
|           | (Plant)              | (mm)            | (cm)           |                     | (gm)           | (gm)                   |
| T0        | 22.71b               | 10.59e          | 5.57e          | 4.57e               | 4.80d          | 38.34d                 |
| T1        | 31.26a               | 12.37ab         | 7.66b          | 5.95abc             | 5.98a          | 45.36a                 |
| T2        | 29.01a               | 12.07c          | 6.57d          | 5.74bcd             | 5.82ab         | 45.41a                 |
| T3        | 27.97a               | 11.61d          | 6.33d          | 5.41d               | 5.29c          | 39.77cd                |
| T4        | 23.19b               | 11.81d          | 7.11c          | 5.61cd              | 5.46bc         | 41.20bc                |
| T5        | 28.07a               | 12.52a          | 7.73b          | 6.08ab              | 6.10a          | 42.67b                 |
| T6        | 29.50a               | 12.23bc         | 8.07a          | 6.14a               | 6.16a          | 45.92a                 |

The reason for increasing the weight of 100 green seeds may be due to the fact that the proportion of hormonal substances formed in the seeds of treated plants was high, which was reflected in the increase in the proportion of withdrawal of food produced by photosynthesis into the seed or the abundance of food produced by photosynthesis which in hence vegetative growth (Table 3), and reduced the competition between the seeds formed in the withdrawal of these materials, which reflected the increase in the weight of the seed.

The superiority treatment by addition of 4 g.l⁻¹ Humic acid for soil in the number of pods/ plant (Table 4) may be due to an increase in the number of lowers formed on the plants by this treatment (Field watch), which led to the increase in the number of branches/plant in (Table 3).

The advantage of mixing the addition of 2 g.l⁻¹ of Humic acid for soil+spray 1.5 ml.l⁻¹ Tecamin max on the plant in the trit pod diameter this may be due to the fact that this mixture of organic fertilizers may be encouraged the increase of hormonal products (Gibbrolins and cytokines) due to the direct affect of the organic compounds found in these.

3- The effect of Humic acid and the Tecamin max and their mixed treatments in the yield parameters of green peas.

The results of Table (5) show that the mixing treatment (T6) recorded the highest values in the parameters of the rate yield of green seeds/plant (105.14 g) and yield green (seeds.ha⁻¹ 4.934t.ha⁻¹). Also (T6) was significantly superior to the treatment (T3) in the characteristics of the date of appearance of the first flower of the plant and the yield of the green seeds plant(105.14g) and hectare respectively for two traits and the value of T.S.S to the green seeds reached to 13.96%.

Data indicate that (T6) significantly exceeded the treatment (T0) in the traits of the appearance the first flower of the plant, early yield of green pods/plant⁻¹, total yield of green pod/plant⁻¹.

The yield of the green seed of the plant and hectare, biological yield and T.S.S. valve in green seeds the increscent in the percentage reached to 10.67%, 24.08%, 40.00%, 37.93%, 41.90 and 15.26% respectively for these traits. Meanwhile, (T1) was gave the highest values in parameters of the date of appearance of the flower of plant 69.66 days and the early yield of green pods/plant⁻¹ 37.20 g and the
total yield pods.plant\(^{-1}\) 186.84g, which significantly exceeded most of the studied treatment in this traits. While the control treatment (T0) recorded the lowest values in all studied parameters of green peas, (Table 5).

**Table (5)** effect of Humic and spray of Tecamin max and mixed treatments in the yield parameters of green pea.

| Treatment | Date appearance first flower | Early yield pods. Plant\(^{-1}\) | Total yield pods. Plant\(^{-1}\) | Yield green seeds. Plant\(^{-1}\) | Yield green seeds. Ha\(^{1}\) | Biological yield | T.S.S % |
|-----------|-----------------------------|---------------------------------|-------------------------------|--------------------------------|------------------------|-----------------|--------|
| T0        | 84.33a                      | 23.20c                          | 108.91c                       | 65.26d                         | 3.062d                 | 174.36d         | 11.83c |
| T1        | 69.66c                      | 37.20a                          | 186.84a                       | 98.46a                         | 4.620a                 | 296.60a         | 15.90a |
| T2        | 70.66bc                     | 30.63b                          | 168.85ab                      | 93.48ab                        | 4.387ab                | 255.44b         | 13.93b |
| T3        | 75.33b                      | 31.02b                          | 154.01b                       | 82.55bc                        | 3.874bc                | 239.26bc        | 13.20bc |
| T4        | 75.00bc                     | 26.49c                          | 126.61c                       | 78.60cd                        | 3.688cd                | 208.82c         | 12.70bc |
| T5        | 73.33bc                     | 31.99b                          | 171.11ab                      | 96.71ab                        | 4.538ab                | 264.38ab        | 13.30bc |
| T6        | 74.33bc                     | 30.56b                          | 181.44a                       | 105.14a                        | 4.934a                 | 294.10a         | 13.96b |

The superiority of mixing treatment is the addition of 3 g.l\(^{-1}\) of Humic acid for soil + spray 3 ml.l\(^{-1}\) Tecamin max on plant in the characteristics of the yield of green seeds for plant and hectares (Table 5) may be due to the superiority of this treatment in the components of the yield parameters which represented by the number of seeds.pods\(^{-1}\) and weight of green pod and the weight of 100 green seeds (Table 4) which was therefore reflected in the increase in seeds yield of plant and hectare.

The superiority of treatment (T1) add 4 g.l\(^{-1}\) of Humic acid of the soil in the trait date of appearance of the first flower on the plant this may be to the nature of the structure of the Humic acid (Table 2), which encourage the formation of a strong and large roots collection of the plants by this treatment (field watch), which may led to an increase in the amount of nutrients absorbed either by the release from the soil or already found in the Humic acid and accelerated the formation of a large vegetative total of the plants by this treatment,(Table 3) which stimulated the early entry of the plant into the reproductive stage (ching, 1977 and al-Saleem, 2017).

The advantage of the addition of 4 g.l\(^{-1}\) of Humic acid of the soil in the trait early yield of pea pods may be due to the introduction the plants of this treatment in the reproductive stage and the formation of pods early (Table 5). The superiority of this treatment (T1) in the trait of plant yield of green pods may be due to the increase in the number of pods formed on the plants of this treatment (Table 4).

while the treatment of the addition of 4 g.l\(^{-1}\) Humic acid in the trait percentage of solids soluble in seeds, it may be due to the effect of Humic acid in the center of the plant growing roots because of the components of Humic acid (Table 2), which is rich in nutrients (Abu Nuqta, 1995), this increase in the quantities of nutrients absorbed, which reflected in increased metabolism, including the production of a simple sugars and carbohydrates.

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