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The Effect of Leonardite and Inorganic Fertilizers on the Cucumber Growth

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Abstract: This study was conducted to determine the effect of leonardite and inorganic fertilizers on growth cucumber in greenhouses and laboratories of Agricultural Faculty at the Bingöl University in 2011. Research was carried out in completely randomized design with five replications. Two fertilizer sources were used in experimental design constituted; 20-20-0 (0, 1, 1.5 and 2 kg/ha) and leonardite (0, 2.5, 5 and 7.5 kg/ha) were applied. Cucumber plants were grown until the flowering and some parameters related to the growth were assessed. The results of the study have shown that the differences among fertilizer applications were statistically significant in respect to stem height, root length, shoot and root fresh weight, shoot and root dry weight, and leaf numbers of cucumber plants. On the other hand, flower numbers and stem calipers were significantly affected by the fertilizer applications. The findings of the study have revealed that leonardite could be used as a fertilizer in organic farming.

Keywords: Soil fertility, 20-20-0 fertilizer, leonardite, cucumber growth

1. Introduction

The normal development of plants in a soil nutrients and does not contain an adequate level in order to provide optimum efficiency, amounts of plant nutrients from the soil to add the needed quantity required. Culture bitiklerince the amount of nutrients needed herbal properties, environmental conditions, soil properties, soil and plant management may vary depending on the level (Erkoç, 2009). Nutrients in the soil on the land at the beginning of the first analysis of the transactions are made. However, the amount of the elements present in the soil show a soil analysis in general, the efficiency of land use and management issues in a healthy way, and a comprehensive and far from giving enough information. Providing plants grown in soil experiments, the territory of remedial interpretation of the different materials used and the results obtained in this context would be more realistic. Body and accelerate the growth of root development in plants, Bills of nutrients by plants to provide a better, strengthen the organic and inorganic soils poor in nutrients and soil improvers are used to improve soil fertility. Leonardite studied extensively in recent years to improve the soil material.
Leonardit, with less oxygen, the bottoms of lakes formed by the dissolution of decayed matter, organic matter, and plenty of easily recognizable sedimentary deposits containing the organism can be expressed as residue. Containing large amounts of carbon and humic acids, organic material is a natural form of coal and organic content can reach a value of 75% (Çivit, 2010). Karaman (2012), leonardit, flick had become converts to release nutrients, increases the water holding capacity of the soil, prevents the binding surface of the earth crust, helping the formation of humus in the soil, increase the speed of seed germination, soil aeration orchestrating reported. A study has been conducted in a pot experiment leonardit, phosphorus and zinc application of the plant dry weight, phosphorus and zinc content of other plant nutrients (N, K, Fe, Mn) investigated the effects of Leonardite phosphorus and zinc, and which together with the case of application of the plant growth promoting plant was determined to increase the intake of phosphorus and zinc (Yılmaz, 1993).

Various organic treatments (gyttja, alsil, seaweed, humic acid, straw and peat) and inorganic fertilizers Pistachio (Pistacia vera L.) seedlings to study the effects on the growth and development of the study, the physical properties of organic healers on the plants until at least the positive chemical fertilizers they perceived as reported (Demirkiran and Cengiz, 2011). Leonardit soil is mixed directly used as the organic soil improver, plant nutrients include, toxic element content is low and is high humic acid content, both liquid and granular form of humic acid derivatives of concentrated spray or drip irrigation systems in most countries have caused widespread leonardit (Çivit, 2010; Bahadırli, 2011). In this research, representing the region to Bingöl and inorganic fertilization on soil leonardit on the development of cucumber plants were investigated.

2. Materials and Methods

This research, in June 2011 - September 2011 between Bingol University, Faculty of Agriculture, conducted laboratory and greenhouses. Cucumber seeds of native plant material used in the study. In the experiments, peat and perlite growing medium mixture (3:1, v: v) was used. Cucumber seeds in the greenhouse, in a 3:1 ratio in a mixture of peat and perlite, and each compartment has a volume of 75 cm³ 45 viol planted. Seeds are planted at a depth of 0.5-1 cm in the same growth medium and lightly covered with a suppressed. After sowing was irrigation. Seedlings are watered on a regular basis, after completing the cotyledon leaves of the plant to be diluted 1 each in each bay. 25 ml of tomato plants seedling stage once NPK 20-20-20 + ME (1 g / L) fertilized with manure. Greenhouse experiment, was established as a completely randomized design with five replications. Potted attempt loamy soil property used to represent the earth showing the plain land Bingöl (from Bingöl-Genç, Murat Basin) were evaluated. Analysis of the soil used in the study, BU Soil Science and Plant Nutrition, Faculty of Agriculture laboratory is made of some soil analysis results in Table 1 are shown. According to the results discussed in the soil, slightly acidic in pH, with a
sandy loam texture, low in lime content, organic matter at the level and the low level of salinity status. This is discussed in terms of features suited to answer this soil organic and inorganic fertilizer.

Table 1. Some properties of the soil used in the study.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Text.</th>
<th>pH</th>
<th>CaCO₃</th>
<th>O.M</th>
<th>T.salt</th>
<th>P₂O₅</th>
<th>K₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>SL</td>
<td>6.8</td>
<td>1.5</td>
<td>0.46</td>
<td>0.06</td>
<td>160</td>
<td>63.6</td>
</tr>
</tbody>
</table>

Four liter plastic pots used in the experiment. 4 kg of soil per pot and the pots filled organic and inorganic nutrients in the soil at various doses were applied. As organic material; Leonardite ha 0, 2.5, 5 and 7.5 kg applied to pots account. Agriculture Co. İzotar used in the study Leonardit. (İzmir) were obtained from. Leonardite used in powder form, humic acid content of 40-70%, organic matter content of 40-80%, 20-30% humidity is between pH 6-7. As inorganic material, the fertilizer 20-20-0 0, 1, 1.5 and 2 applied to account kg. ha-1. The homogeneous mixture is obtained by using fertilizer and soil pots in the şaşırtılmıştır tomato seedlings are 5-6 leaves. Plants watered by hand as needed and weed control was still manually. Soil organic and inorganic fertilizers applied to tomato plants, flowering plants to determine the stage of development of the plant height, number of true leaves, stems, fresh and dry weight, stem length, stem diameter, number of flowers such parameters were determined. The data obtained by analysis of variance F was applied in order to resolve the significant discrepancies between the groups to determine what is the difference between the groups in which the LSD test was performed. Statistical analyzes were SAS V8 package program.

This study was conducted to determine the effect of leonardite and inorganic fertilizers on growth cucumber in greenhouses and laboratories of Agricultural Faculty at the Bingöl University in 2011. Research was carried out in completely randomized design with five replications. Two different fertilizer sources were used in experimental design constituted; 20-20-0 (0, 1, 1.5 and 2 kg/ha) and leonardite (0, 2.5, 5 and 7.5 kg/ha) were applied. Cucumber plants were grown until the flowering and some parameters related to the growth were assessed. The results of the study have shown that the differences among fertilizer applications were statistically significant in respect to stem height, root length, shoot and root fresh weight, shoot and root dry weight, and leaf numbers of cucumber plants. On the other hand, flower numbers and stem calipers were significantly affected by the fertilizer applications. The findings of the study have revealed that leonardite could be used as a fertilizer in organic farming.

3. Results and Discussion

Cucumber plants with soil mixed with different proportions of organic and inorganic fertilizers, plant height, number of true leaves, stems, fresh and dry
weight, stem length, stem diameter, number of flower effects are given in Table 2. Wet and dry weights of tomato plants on the effects of fertilizer applications were found statistically significant. Both organic and inorganic fertilizer applications, a positive effect on the body weight of the wet and dry. The above findings are consistent with previous studies conducted on the subject. Sanders et al. (1999), David et al. (1994), and Petsas Lulakis (1995), Alvarez et al. (1996), Loffredo et al. (1997), Pade (1998), Pade et al. (1999), let alone and Assurance (1999), humic acid on plant growth and nutrient content of their studies in order to determine the effects of increased intake of some nutrients and seedling shoot and root, leaf, root and shoot development reported that the positive effect of humic acid.

In another study on the subject, Malik and Azam (1985), applied at different doses in order to investigate the effect of humic acid on the growth of wheat, growing environment, 18, 36, 54 and 72 mg / L of humic acid implemented. Researchers up wheat development environment 54 mg / L of humic acid is obtained through the application determined. In addition, doses of 500% the length of the root and stem dry matter production is also reported that an increase of 22%. Tomato plants, tomato plants are soil applied soils applied leonardite by sulfur plant growth parameters, a higher yield and fruit bulkiness value formed (Erkoç, 2009). In our study, a positive effect on plants leonardit may be due to many reasons. Leonardite humic acid as a source of the best known.

Table 2. Cucumber plants with soil mixed with different proportions of organic and inorganic fertilizers

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Plant height</th>
<th>Root height</th>
<th>Total fresh weight</th>
<th>Root fresh weight</th>
<th>Stem fresh w.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 20-20-0</td>
<td>54.125 BC</td>
<td>20.388 BC</td>
<td>5218 B</td>
<td>299.25 BDC</td>
<td>4919 B</td>
</tr>
<tr>
<td>(1 kg/ha) 20-20-0</td>
<td>47.525 C</td>
<td>14.350 C</td>
<td>5239 B</td>
<td>189.00 D</td>
<td>5050 B</td>
</tr>
<tr>
<td>(1.5 kg/ha) 20-20-0</td>
<td>68.575 AB</td>
<td>26.900 AB</td>
<td>10379 A</td>
<td>425.25 ABC</td>
<td>9954 A</td>
</tr>
<tr>
<td>(2 kg/ha) Leonardite 20-20-0</td>
<td>53.825 BC</td>
<td>15.500 C</td>
<td>5570 B</td>
<td>266.50 DC</td>
<td>5303 B</td>
</tr>
<tr>
<td>(2.5 kg/ha) Leonardite 20-20-0</td>
<td>74.050 AB</td>
<td>24.725 AB</td>
<td>10616 A</td>
<td>438.33 AB</td>
<td>10178 A</td>
</tr>
<tr>
<td>(5 kg/ha) Leonardite 20-20-0</td>
<td>77.950 A</td>
<td>28.675 A</td>
<td>8651 A</td>
<td>519.75 A</td>
<td>8131 A</td>
</tr>
<tr>
<td>(7.5 kg/ha) Leonardite 20-20-0</td>
<td>58.223 ABC</td>
<td>23.675 AB</td>
<td>5527 B</td>
<td>352.75 BDC</td>
<td>5174 B</td>
</tr>
<tr>
<td>P</td>
<td>0.05*</td>
<td>0.01**</td>
<td>0.001***</td>
<td>0.01**</td>
<td>0.001***</td>
</tr>
<tr>
<td>LSD_{0.05}</td>
<td>20.262</td>
<td>7.471</td>
<td>2169.5</td>
<td>165.55</td>
<td>2101.2</td>
</tr>
</tbody>
</table>
In our study, a positive effect on plants leonardit may be due to many reasons. Leonardite humic acid as a source of the best known. Soil HS, plays an important role in plant development directly and indirectly. Direct impact on the plants, root development and affects the metabolism of nutrients absorbed by plants occurs. HA indirectly, water retention, drainage, and improvement of aeration chelate compounds with metal ions or metallic-forming water-soluble forms, forming hydroxides, of many of these elements can control the resolution (Lobartini et al., 1997). On the other hand, our results are not in compliance in some previous studies. Leaves and soil humic acid is applied to the development of tomato and corn in a study investigating the effect of the purchase of some nutrients, humic acid on tomato plant dry matter content of a statistically significant effect was found (Günaydın, 1999).

Representing the region to identify and improve the productivity of the land Bingöl conducted for this study, it was observed that soils are usually low in organic matter. To do this, nitrogen (in addition to phosphorus) 20-20-0 fertilizer with the soil content to be healthier and more productive making a positive impact on cucumber plants were grown in the leonardit applications. As a result, leonardit and inorganic fertilizer (20-20-0) tomato plants grown in applying inorganic fertilizer 20 kg / ha gave the best answer to the application, the application leonardit yarışgambarlığı 20-20-0 fertilizers and leonardit application has been found to play a role in the development of more radical.

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References


