



Impact of Soil Mulches and Garlic Extract Spraying on Growth of Cucumber *Cucumis sativus* L. Grown in Plastic Houses at Najaf Desert

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ABSTRACT

The experiment was conducted during the growth season of 2013 - 2014 autumn and spring at the desert of Najaf Governorate of plant cucumbers Toshika. The aim was to study the effect of soil mulches and garlic extract spray on the growth of cucumbers grown in a greenhouse. The experiment included 16 treatment interaction between soil mulches such as (without mulches, black polyethylene, transparent polyethylene and rice residues) and garlic extract spray at different rates (0.0, 2.5, 5.0, and 7.5 ml. L⁻¹) on vegetative growth plants were sprayed. Then spray was adopted at two weeks intervals that means two times plant were sprayed during the growing season. Design of the study was split Plot Design within Randomized Complete Block Design with three replicate. The means were compared at the probability of 0.05 by least Significant Differences (LSD). Results showed as follow. Plants grown under black polyethylene were higher in most vegetative growth Characteristics (leaves number, leaf dry matter percentage and leaf contents of nitrogen) which is Produced the highest values of the vegetative growth characteristics season as compared with control treatment (spray with distilled water only). Interaction effects between soil mulches and garlic extract spray were significant on studying vegetative growth characteristics for the two seasons. The interaction of black polyethylene with 5 ml.L⁻¹ gave the highest means of vegetative growth as compared with the interaction of control that gave the least means for the above studied characteristics of the first and second season.

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Introduction

Cucumber is (*Cucumis sativus* L.) crops of the Cucurbitaceae family *Cucurbitaceae* summer and important countries in the world, including Iraq, India, Africa, and China were cultivated in these areas for thousands of years and despite the fact that water constitutes a large proportion of fruits weight, but it is characterized by food and medicinal value as it contains elements of CA and P and K, vitamin C, B1, B2 and niacin (Arnaout, 1980). The advantage of the fruits of desirable cucumber consumer demand for it increases the length of the months of the year and in order to meet this

Growing demand for a major development on the field of producing cucumbers happened in both open farms conditions or in protected agriculture. In order to increase production per unit area is followed by modern agricultural methods at the development of hybrid. Varieties are adopted a new technologies to serve the crop, Hybrids vary female cucumbers in terms of the rate of productivity per unit area, depending on the ability of genetic and environmental conditions prevailing during development and production period (Almakhtar, 1988) reached in China and America (28,0499 and 920,000) tons on respectively with an area of 4590038 and 155 194 hectares respectively, (FAO, 2007) Either in Iraq cultivated area in the year 2007 amounted to (44.50) thousand hectares (Annual Statistical Abstract, 2007) Notes: there are drops in productivity per unit area in Iraq and attributed the cause of this decline to the lack of use of modern technology in agriculture, and noted the cucumbers plants service method under protected cultivation conditions are the large number of chemical fertilizer additives and pesticides through the soil or spraying on the plants. At the fact of the matter is all pollutants or toxins have an impact

negative immediate or long-term in human or the environment in general. So, the recent trend among specialists appeared in the field of agriculture, is to follow the control biological and organic nutrition. Organic Nutrition method (plant extracts) as an alternative to pesticides and chemical fertilizers (Elia et al., 1998). As well as study the effect of soil mulching, what the impact of this process (Physio biological activities) of the soil as well as the microclimate (Micro climate). The Natural compounds can serve them the same purpose for which the industrial play materials, but at the same time should be generally less which were not non-existent risk for human, environmental and living organisms (Abo Arab et al., 1998) These compounds can be produced from different plants roots and the market, leaves, flowers, fruits, seeds, lobes and even the pollen parts. And longer leaves roots lobes are the main source of these compounds (Horsley, 1977). Research has shown that compounds have different effects which have a disincentive, including what will be a catalyst for the growth of vegetation and the little ones have no effect (Rice, 1984) So, the search for natural alternatives characterized by their toxicity to humans and animals and non-polluting, inexpensive and produce clean food. It is very important at the present time on the standards of developed countries. Therefore, the aim of this study was to evaluate different types of soil machines to realize the best mulching in influencing the growth of cucumbers plant inside greenhouses and study the effect of different concentrations of garlic extract in a plant growth of cucumbers in greenhouses and see the effect of interactions between soil mulches and garlic extract at a plant growth of cucumbers in greenhouses.

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Table 1. Physical and chemical characteristics of the soil and the plastic house the well water used in irrigation.

| The degree of electrical conductivity (Dessie Siemens. M ⁻¹) | | Autumn | | Spring | |
|---|-------------------------------|---------------|------------|---------------|------------|
| | | Soil | Well water | Soil | Well water |
| | | 3.61 | 4.3 | 3.85 | 4.1 |
| PH | | 7.65 | 7.50 | 7.45 | 7.33 |
| Lime (g.Kg ⁻¹) | | 175.36 | 0 | 195.55 | 0 |
| Cations (m-mol shipment .L ⁻¹) | K ⁺ | 0.3 | 0.6 | 0.7 | 1.2 |
| | Na ⁺ | 10.0 | 12.0 | 20.0 | 27.4 |
| | Ca ⁺⁺ | 12.4 | 14.9 | 14.0 | 16.0 |
| | Mg ⁺⁺ | 10.0 | 12.0 | 12.0 | 13.0 |
| Negative ions dissolved m- Mol charged.L ⁻¹ | HCO ₃ ⁼ | 2.0 | 1.7 | 1.9 | 2.3 |
| | CO ₃ ⁼ | Nil | Nil | Nil | Nil |
| | Cl ⁻ | 14.5 | 17.5 | 17.0 | 19.0 |
| | SO ₄ ⁼ | 23.5 | 25.0 | 25.0 | 28.0 |
| Major elements Ready Melgn. L ⁻¹ | N | 4.81 | 2.25 | 4.10 | 3.03 |
| | P | 4.24 | 3.56 | 4.12 | 3.78 |
| | Fe | 3.86 | 0.43 | 3.03 | 0.65 |
| | Clay | 100 | | 100 | |
| Detached soil g. Kg ⁻¹ | Silt | 180 | | 160 | |
| | Sand | 720 | | 740 | |
| Woven soil | | Mixture sandy | | Mixture sandy | |

Table 2. show the effect of soil mulching and spray garlic extract in average number of leaves (leaf. Plant -1) and seasonal agriculture

| Treatment | | Season autumnal | Spring season |
|--|---------------------|-----------------|---------------|
| Soil mulching | Without mulching | 31.37 | 17.89 |
| | Plastic Transparent | 33.82 | 20.89 |
| | Plastic black | 34.65 | 23.90 |
| | Rice residues | 33.45 | 23.11 |
| | L.S.D (0.05) | 2.80 | 3.55 |
| Concentrations spraying (ML L ⁻¹) | 0 | 29.09 | 19.09 |
| | 2.5 | 34.23 | 22.27 |
| | 5.0 | 35.47 | 21.84 |
| | 7.5 | 34.23 | 22.59 |
| | L.S.D (0.05) | 2.30 | 1.93 |
| Soil mulching × concentrations spraying | 0 | 26.36 | 16.86 |
| Without mulching | 2.5 | 35.86 | 19.20 |
| | 5.0 | 32.26 | 18.26 |
| | 7.5 | 30.96 | 17.23 |
| Plastic Transparent | 0 | 29.50 | 18.16 |
| | 2.5 | 34.46 | 21.73 |
| | 5.0 | 36.06 | 21.76 |
| | 7.5 | 35.26 | 21.90 |
| Plastic black | 0 | 29.50 | 19.16 |
| | 2.5 | 34.90 | 24.16 |
| | 5.0 | 40.26 | 23.83 |
| | 7.5 | 33.96 | 28.43 |
| Rice residues | 0 | 31.00 | 22.16 |
| | 2.5 | 31.70 | 24.00 |
| | 5.0 | 34.36 | 23.50 |
| | 7.5 | 36.73 | 22.80 |
| | L.S.D (0.05) | 4.50 | 3.72 |

Table 3. the effect of soil mulches and sprays garlic extract in the percentage of dry matter Leaves and interaction % for seasonal agriculture

| Treatment | | Season autumnal | Season spring |
|---|---------------------|-----------------|---------------|
| Soil mulching | Without mulching | 41.0 | 42.7 |
| | Plastic Transparent | 40.5 | 52.5 |
| | Plastic black | 42.7 | 54.1 |
| | Rice residues | 43.8 | 48.5 |
| | L.S.D (0.05) | N.S | 5.4 |
| Concentrations spraying (M.L.L ⁻¹) | 0 | 41.3 | 41.5 |
| | 2.5 | 41.6 | 49.4 |
| | 5.0 | 45.4 | 52.2 |
| | 7.5 | 39.7 | 54.8 |
| | L.S.D(0.05) | 2.5 | 3.9 |
| Soil mulching × concentrations spraying | 0 | 39.8 | 35.3 |
| Without mulching | 2.5 | 39.5 | 41.2 |
| | 5.0 | 42.8 | 44.2 |
| | 7.5 | 41.9 | 50.0 |
| Plastic transparent | 0 | 40.6 | 48.5 |
| | 2.5 | 40.9 | 51.7 |
| | 5.0 | 40.8 | 56.2 |
| | 7.5 | 39.7 | 53.8 |
| Plastic black | 0 | 40.6 | 46.1 |
| | 2.5 | 42.2 | 55.7 |
| | 5.0 | 54.7 | 57.5 |
| | 7.5 | 31.1 | 57.2 |
| Rice residues | 0 | 44.0 | 36.14 |
| | 2.5 | 43.9 | 48.9 |
| | 5.0 | 43.2 | 53.4 |
| | 7.5 | 44.0 | 55.2 |
| | L.S.D(0.05) | 4.9 | 7.9 |

Table 4. the effect of soil mulches and spray garlic extract content at the leaves of nitrogen g. Kg - 1 and seasonal agriculture

| Treatment | | Season autumnal | Spring season |
|---|---------------------|-----------------|---------------|
| Soil mulching | Without mulching | 31.48 | 29.30 |
| | Plastic transparent | 37.77 | 35.69 |
| | Plastic black | 41.86 | 39.63 |
| | Rice residues | 43.41 | 38.00 |
| | L.S.D (0.05) | 3.20 | 2.77 |
| Concentrations spraying (M.L.L ⁻¹) | 0 | 34.75 | 32.45 |
| | 2.5 | 38.01 | 36.42 |
| | 5.0 | 40.93 | 37.90 |
| | 7.5 | 39.82 | 35.8 |
| | L.S.D (0.05) | 1.95 | 2.56 |
| Soil mulching × concentrations spraying | 0 | 31.19 | 27.49 |
| Without mulching | 2.5 | 31.77 | 30.14\ |
| | 5.0 | 31.21 | 30.13 |
| | 7.5 | 31.76 | 29.44 |
| Plastic transparent | 0 | 32.72 | 31.12 |
| | 2.5 | 35.37 | 33.07 |
| | 5.0 | 41.23 | 38.41 |
| | 7.5 | 41.78 | 40.17 |
| Plastic black | 0 | 36.24 | 34.97 |
| | 2.5 | 43.31 | 42.46 |
| | 5.0 | 45.85 | 42.67 |
| | 7.5 | 42.03 | 38.41 |
| Rice residues | 0 | 38.85 | 36.23 |
| | 2.5 | 41.62 | 40.03 |
| | 5.0 | 45.43 | 40.40 |
| | 7.5 | 43.73 | 35.35 |
| | L.S.D (0.05) | 3.90 | 5.12 |

Materials and methods

Experiment field

The experiment was carried out in a non-heated greenhouses and deport 56 × 9 m private farm located at the desert region of the city of Najaf, but both seasons autumnal 18/8/2013 and spring 2014/1/9, has analyzed the soil before planting field to take random samples from different places of the plastic house and two depths 30 and 60 cm, are shown in Table (1) physical and chemical properties of soil house.

Soil preparation

The plastic house and through the entire settlement, soil, plastic house and then divided into three lines, each line length is 56 m and a width of 50 cm after that was added compost decomposed on the three lines. For the purpose of the prevention of fungal diseases Radomal pesticide was added at a rate of 3 kg per acre. It was then added the amount of sand to each line so that one line became rises from the floor of the plastic house at 15 cm and the distance between the last 50 cm line and left a 75 cm distance from all sides of the house. And then put drip irrigation pipes on both sides of Mister, and left distance 90 cm at the entrance and the end of each replication. Sprinkle garlic extract integration began after two weeks of germination by various transactions where sprayed plants until full wet and then rolled sprinkles the duration of two weeks between the spray and the other at a rate of two sprays during the growing season, and the autumnal season smaller applied to the spring season (Sahaf, 1995). mixer also mulching transactions carried out after the completion of the creation of the earth and set up a drip irrigation system with four types of mulching age (without mulching, black plastic, transparent plastic, remnants of rice) 0.10 micron thickness and dimensions of 2.25 m and a width of 0.75 m for the plastic mulching, where punctured plastic slides black and transparent holes 10 cm in diameter and the distance between the center hole and another 40 cm, and proved to slide on both sides of soil Mister to prevent heat leakage from under the hood to the outside (Alwan ,1984 and Hiemelrick and Dozier, 1991 and Hartz et al., 1993)

Preparation of extract garlic cloves

Samples were collected from the garlic cloves from the local market. It was the percentage of moisture which account after purchased, as the moisture was (69.8%) extract garlic prepared to take a sample of the lobes peeled and weighing 250 g mixed with 250 cm³ of distilled water and blend the mixture electric mixer for 5 minutes. The mixture was nominated by soft cloth, and collected from filtrate in a sterile glass vial promised full strength filtrate (Stock 100%). And it was attended by the following concentrations (0, 2.5, 5.0, 7.5) mL.L⁻¹ (Sleam , 1978 and Haider, 1996). By using 2.5 ml volume and the completion of a liter of distilled water are the same way. I attended concentrations the other extract record was keeping the way previously mentioned at the refrigerator until of use. Shows are the extensions (1) the most important chemical compounds contained in 100 cm³ cloves of garlic (Omran, 2004) .

Transactions

The study included the impact of two factors which soil mulching (without mulching , transparent plastic, black plastic and plant residues) With the use of 4 concentrations of garlic extract (0, 2.5, 5.0, 7.5) mL.L⁻¹ the number of transactions 16 treatment and three replications. The number of experimental units is 48 units. Where the length of the experimental unit 2m and a width 0.5 m of any area. The unit (1) m² and the number of plants at the experimental unit 10 plants on both sides of Mister and the distance between the plant and another 40 cm.

Culture

Seeds planted hybrid cucumbers varieties Toshka holinda origin, a female varieties Gynecious. In early flowering was dated 18/08/2008 for the autumn season 9/1/2014 and spring season put three seeds in each hole and mixture on both sides of the distance between the plants to add another 40 cm between mister and another 50 cm. This has irrigation soil after the completion of the process of planting seeds as drip irrigation technology. The seeds were planted at the entrance and at the end of each replication to be the guardian plants. After germination eased plants to leave one plant in each Jouret then carried out all the various agricultural operations, and the suspension of irrigation plants on leads and combat disease and insects and uniformly to al transactions (Abdul and Mohammed,1986).

Experimental Design

The experiment was performed in Split-plot design within Randomized Complete Block Design (RCBD). For two seasons the experiment included the first two factors of soil are distributed within the main plot mulches and the second factor is a water garlic . Extract distributed in panels subplot and three replications as the number of experimental 48 units (AL-Rawi and Khalf, 2000) compared to average less teams calculated moral LSD at 5% level of significance and use the SAS program (2001) in the statistical analysis of the data.

Result And Discussions

Number leaves (leaf. Plant -1)

Results shown on the table (2) there is a significant effect of soil mulchings in the average number of leaves per plant has given the use of black plastic highest rate in number of leaves per plant was reached 34.65 - 23.90 leaf plant -1 respectively. The rate was lower when compared to treatment as 31.37 reached leaf plant -1 - 17.89 and leaf plant-1 . The last period of growth and seasonal agriculture respectively and it is shown on table (2) the existence of a significant effect spray garlic extract on a number of leaves per plant in both seasons autumn and spring gave 5.0 mL.L⁻¹ highest rate. The number of leaves were reached 35.47 leaf .plant -1 compared with 29.09 for the season autumnal , while 7.5 mL.L⁻¹ gave the highest rate of number of the leaves amounted to 22.59 compared with 19.09 leaf .plant- 1, when the concentration 0 mL.L⁻¹ for seasonal agriculture respectively. The show interaction transactions between soil mulching's and spray extract garlic on the existence of a significant effect on the average number of leaves per plant. The outperformed treatment of the overlap using a black plastic with spray 5.0 mL.L⁻¹ and gave the highest increase in average number of leaves per plant reached 40.26 leaf. Plant -1 . For the autumn season and excelled treatment using a black mulching with spraying 7.5 mL.L⁻¹ in the spring season by giving them the highest increase of 28.43 and leaf. plant -1 as it was significantly increase compared to the treatment of the comparison that the number of leaves which totaled 26.36 leaf and 16 0.86 leaf plant-1, for seasonal agriculture respectively.

The percentage of dry matter in leaves

Table (3) shows that the soil mulching did not affect morale in the percentage of dry matter in the leaves of autumnal season, but influenced morally season. Spring gave a black plastic highest dry matter in leaves amounted to 54.1% compared with the comparative treatment in which the ratio was 42.7%. As for the spray may add garlic extract led to a significant increase in proportion of dry matter of leaves, with a concentration exceed 5 and 7.5 mL.L⁻¹ to give a higher proportion of dry matter in the stock amounted to 45.4 and

54.0% compared with the comparative. The concentration gave the lowest percentage 41.3 and 41.5% for seasonal agriculture respectively. The results also demonstrate the existence of a significant effect of the interaction between the soils and spray garlic extract in the percentage of dry matter of the leaves and agriculture seasonal. It outperformed the treatment of interaction using a black plastic and spraying with 5.0 mL⁻¹. gave the highest percentage of 54.7 and 57.5% compared to Say ratio. When comparing the treatment, which amounted to 39.89 and 35.39% for agriculture seasonal respectively. Due to the fact that the soil mulching process will lead to the lifting of the degree of soil and especially black mulching heat. This leads to increase absorption of water and nutrients and move to the top of the plant and increase cell division. The formation of Principles of leaves, leading to increase number of leaves and in turn leads to increase the percentage of dry matter exchange or it might be caused outweigh. The plants in number of leaves and the percentage of dry matter for leaves to be owned garlic extract from similar materials Balooudi. Therefore, to help to increase the concentration of growth regulators within the plant, and this leads to increased cell division and then increase the number of leaves.

Leaves content of nitrogen (g. Kg⁻¹)

Table(4) showed existence of a significant effect to mulching of the soil in the stock content rate of nitrogen g.kg⁻¹ and the autumnal season, remnants of rice has given the highest rate reached 43.41 g.kg⁻¹, The lowest rate of nitrogen was the comparison without mulching age as 31.48 Gm.cgm⁻¹, Either the spring season was higher than black plastic gave the highest rate of 39.63 g.kg⁻¹ treatment compared to the comparison amounted to 29.30 g.kg⁻¹, Table (4) the existence of a significant effect of garlic extract in spray leaves content rate of nitrogen in both autumn and spring seasons, gave concentration 5.0 mL⁻¹ Higher nitrogen content at the rate stood 40.93 and 37.90 g.kg⁻¹ while the lowest concentration was 34.75 and 32.45 g.kg⁻¹, When comparing the treatment of seasonal and agriculture respectively. It shows inter cation between the transactions soil mulching and spray garlic extract on the existence of a significant effect on the stock content of nitrogen and seasonal agriculture. Since outperformed the treatment of inter cation using black mulching and spraying with 5.0 mL⁻¹ of garlic extract and gave the highest percentage of 45.85 and 42.67 g.kg⁻¹ They were significant increase compared to the treatment of comparison which gave 31.19 and 27.49 g.kg⁻¹ seasonal agriculture respectively. This may be due the reason that black plastic cause an increase in heat accumulation and an increase at the heat rooting degree lead to be increased. Absorption of nitrogen component within the plant or may be due to the temperature of the area around the high-seated lead to be increased plant space root on growth, length and number of ramifications leading to be increased. Space and Suck enable them to reach the ion sites at the soil high temperatures increasing the activity and breathing roots. Leading production of energy that is necessary for active absorption of nutrients kindle. The reason out weigh the spray extract of garlic at the leaves content of nitrogen to what is owned by the garlic extract of Materials similar to the auxin and essential elements are helping to increase the concentration of growth regulators within the plant, which increases the shoot and root growth and this will encourage the plant to absorb nutrients such as nitrogen.

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Appendix 1. The most important chemical compounds and mineral elements contained in 100 cm³ of garlic extract

| Chemical compound | Percentage |
|--------------------------|-------------------|
| Water | 59.00 g |
| Calories | 144.00 Kcal |
| Lipids | 0.50 g |
| Carbohydrates | 33.07 g |
| Fiber | 2.10 g |
| Manganese | 1672.00 mg |
| Potassium | 401.00 mg |
| Sulphur | 70.00 mg |
| Calcium | 181.00 mg |
| Phosphorus | 153.00 mg |
| Magnesium | 25.00 mg |
| Sodium | 17.00 mg |
| Vitamin B-6 | 1235.00 mg |
| Vitamin C | 31.00 mg |
| Glutamic acid | 0.86 g |
| Argenine | 0.63 g |
| Aspartic acid | 0.49 g |
| Leucine | 0.31 g |
| Lysine | 0.27 g |