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Response of Cucumber Plants to the Addition of Animal Waste and Dry Yeast Suspension

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Abstract: A factorial experiment was carried out during the year 2021 in one of the villages in the Abu Ghraib district – Baghdad, to evaluate the effect of adding animal waste and dry bread yeast suspension on some vegetative growth characteristics of cucumber plants (Hadeel hybrid) grown under a protected environment. Three types of animal wastes (cattle, sheep and poultry) and dry bread yeast suspension were selected and the control treatment without adding any organic waste. The results indicated that poultry manure showed the best effects in the studied traits, which included leaf area (of 31.69 cm²), dry weight of shoot (40.0 g), number of leaves (32.73 leaf plant⁻¹), stem diameter (11.48 mm), plant length (224.3 cm) and number of nodes 33.73 node plant⁻¹). On the other hand, adding dry yeast suspension to plants improved in all studies of vegetative growth characteristics compared to the control treatment.

Keywords: Cucumber, fertilize, organic manure, biofertilizer, vegetative growth.

Introduction

Cucumber (*Cucumis sativus* L.) is considered one of the most important vegetable crops that are grown under greenhouses due to the high yield resulting from its cultivation as a result of its rapid growth compared to other crops and the lack of competition from the open cultivations of this product during the period of production of greenhouses¹. As well as the quality of the fruits produced compared to open cultivation. Because of its marketing importance, the demand for its cultivation increased after the spread of protected agriculture to provide the crop outside the natural production season. Attention to organic fertilization is an essential matter in modern agriculture, especially in sandy lands that lack organic matter, which is the nutritional balance to meet the basic requirements of nutrients for plants throughout the growth stages². It is also considered the basis that must be laid to raise the productive value of agricultural lands and reduce environmental pollution resulting from the excessive use of mineral (chemical) fertilizers. Therefore, recycling organic waste is one of the essential factors that lead to the provision of quantities of organic fertilizers that meet the needs of agricultural land³. Recent studies confirm the possibility of using natural alternatives such as dry bread yeast to improve growth, flowering and yield in plants⁴. Yeast can produce substances essential for growth, such as hormones (auxins, gibberellins and cytokinins), amino acids and sugars⁵; it also has an essential role in increasing the resistance of plants to diseases and insects⁶. From the preceding, the experiment aimed to evaluate the effect of adding animal waste

and dry bread yeast suspension on some vegetative and reproductive growth characteristics of cucumber (Hadeel hybrid).

Materials and methods

The experiment was conducted during the 2021 season to evaluate animal waste and bread yeast used in the vegetative growth of cucumber (Hadeel hybrid) produced by Seed National Company, which is grown in a protected environment. The experiment treatments included the following:

1. T1: Control (without addition).
2. T2: Add cattle waste (20 tons ha⁻¹).
3. T3: Add sheep waste (15 tons ha⁻¹).
4. T4: Add poultry waste (12 tons ha⁻¹).
5. T5: Add a suspension of dry bread yeast (6 gm L⁻¹ per plant).

The hybrid seeds were sown in cork dishes in the greenhouse, and after the formation of the first two true leaves was completed, the seedlings were transferred to one of the greenhouses in the Zaidan village of Abu Ghraib district – Baghdad. It was planted on terraces that are separated from each other (1.75 m). The terrace length was 12 m, with five terraces for each replication. The animal waste (cattle, sheep and poultry waste) was added to the soil and a suspension of dry bread yeast, in addition to the control treatment, which did not add any of the above study factors. The planting was done on both sides of the terrace, on which the drip irrigation pipes were extended, and the distance between the plants was (0.4 m). The experiment was carried out according to the Randomized Complete Block Design (RCBD), and under the probability level of 0.05, the averages were checked using the least significant difference (LSD) ⁷, and the data were analyzed by Genstat software, 2012.

Studied traits

1. Leaf area: The leaf area was measured using (AN 100) meter and measured at the seventh harvest in a representative random sample of 5 plants from the experimental unit ⁸.
2. The dry weight of the total vegetative: measured at the end of the season.
3. Number of leaves: The number of leaves at the end of the season was counted, and the number of fallen leaves was added.
4. Stem diameter: It was measured at the end of the season using Vernier from the point of contact of the plant with the soil.
5. Plant length: At the end of the growing season, each plant of the measured experimental unit was measured from the region of contact of the stem with the soil to the shoot tip.
6. The number of nodes on the stem was measured at the end of the growing season along the main stem from its contact with the soil to the shoot tip.

Results

Figure (1) showed an apparent effect of adding organic fertilizers, as their treatments significantly increased the studied traits. Treatment T4 (poultry manure) gave the highest values and achieved 31.69 dm², 40.0 gm, 32.73 leaf plant⁻¹, 11.48 mm, 224.3 cm and 33.73 nodes for leaf area, total vegetative dry weight, number of leaves, stem diameter, plant length and number of nodes, respectively. The control treatment (T1) gave the lowest values for the leaf area, weight of the total vegetative, number of leaves, plant length and number of

nodes as it reached 20.79 dm², 22.8 gm, 27.07 leaf plant⁻¹, 176.7 cm and 28.06 nodes, respectively. At the same time, treatment T2 (cattle waste) gave the lowest value for stem diameter character, 9.05 mm.

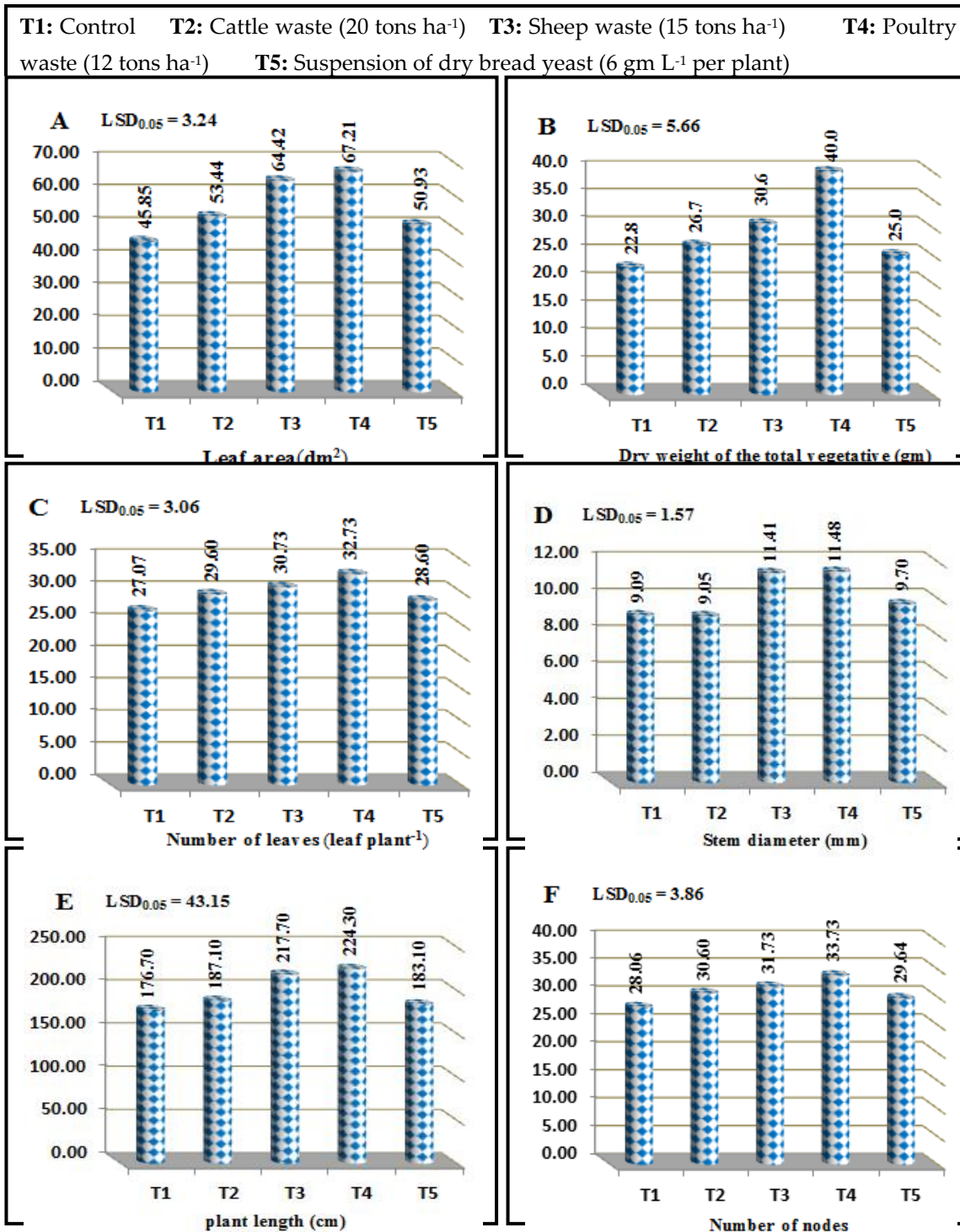


Figure 1. Effect of cucumber plants to the addition of animal waste and dry yeast suspension on some vegetative growth traits.

Discussion

The reason for improving the vegetative growth of cucumber plants when adding animal fertilizers may be due to their role in improving the soil's physical properties, which provides a suitable environment for the growth and spread of roots, thus increasing the absorption of nutrients ⁹. It also contributes to

improving the chemical properties of the soil through its role in the decomposition of organic compounds and the liberation of organic acids such as humic and fulvic acid, which have a practical effect in increasing plant growth¹⁰. In addition to its role in lowering the soil pH, which increases the availability of the plant nutrients such as nitrogen, phosphorous and potassium, which contribute to increasing the efficiency of the leaves to carry out the photosynthesis process, as the nutrients affect the process of fixing carbon dioxide in the green cells of the plant by activating some enzymes related to photosynthesis¹¹, this is reflected in one way or another on plant growth and the formation of new cells and tissues. The monosaccharides directly produced from the photosynthesis process are the main component of the framework structure of the various plant tissues¹². Also, constructing new tissues requires cell division, which depends mainly on building new nucleic acids and proteins. These processes require energy units (ATP) from photosynthesis and respiration¹³. Therefore, organic fertilizer's role in providing the raw materials and energy units needed to build new tissues in the plant structure is clear. As for the dry yeast of bread, it contains large amounts of minerals, proteins, carbohydrates and vitamins¹⁴, which contribute to an increase in physiological processes within the plant¹⁵, which is positively reflected in improving the plant's vegetative growth¹⁶.

Conclusion

After reviewing the research results, the response of cucumber plants grown under the conditions of the protected environment can be concluded with the addition of organic fertilizers (especially poultry waste) and dry bread yeast. Therefore, we recommend fertilizing cucumber plants with organic fertilizers (cattle, sheep and poultry waste) and dry bread yeast, as improving vegetative growth and increasing production in quantity and quality depends primarily on nutritional balance, and malnutrition negatively affects the growth and production of plants.

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