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Bell Pepper Sprouts Produced in Polystyrene Trays with the addition of Turkey Manure in the Substrate

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Abstract

The production of seedlings depends on several factors, and the composition of the substrates is an extremely relevant factor, since the development of the plant is directly related to the physical, biological and chemical properties of the substrate, in this sense, aiming to analyze the viability of seedling production in bell peppers on polystyrene trays (Capsicum annuum L.), with the addition of different turkey manure in doses to the substrate. The experiment was carried out in the experimental area belonging to Faculdade Educacional de Dois Vizinhos - UNISEP – Union de Ensino do Sudoeste do Paraná, Câmpus Dois Vizinhos-PR. The design of this experiment was the completely randomized design (DIC), consisting of five treatments and four replicates of 30 plants each. The treatment consisted of the addition of turkey manure at 0% (control - without turkey manure), 10%, 20%, 30% and 40%, on commercial substrates. The commercial Substrate used was Plantmax®. Sowing of the experiment was carried out in expanded polystyrene trays of 120 cells, which were filled with commercial substrate and the different concentrations of turkey manure. At the transplant stage, shoot height, root length, number of leaves, fresh mass and shoot mass were evaluated. Data were submitted to regression analysis. Plant height responded positively up to the 30% addition rates of turkey manure in the substrate. All the growth and development variables analyzed with the exception of root length showed satisfactory results, when the seedlings were submitted to planting with the addition of 20% turkey manure in substrate. Therefore, the use of turkey manure is efficient in the production of bell pepper seedlings in trays under protected cultivation. However, there is a need to develop further studies.

Keywords: *Capisicum annuum* L. Development. Plants

INTRODUCTION

The bell pepper (*Capsicum annuum* L.) is a fruit vegetable belonging to the genus Capsicum and the family Solanaceae. This culture originates from the American continent, more precisely from Central America, a transition region of temperate and subtropical (DIAS, 2000).

The bell pepper is one of the ten most essential vegetables in Brazil (EMBRAPA, 2007). In the country, the annual growing area of pepper is 13 thousand hectares, with the central producing states being São Paulo, Minas Gerais, Bahia and Rio de Janeiro (EMBRAPA, 2012).

In the system of bell pepper production, the production of seedlings corresponds to one of the most critical stages for the success of the crops (BRAGA et al., 2017), since the excellent performance of the plant in the field is associated to the use of quality seedlings (BEZERRA et al., 2009).

Currently, the most used method for the production of seedlings is through the use of plastic or Styrofoam trays, with the substrate (COELHO et al., 2013). For the success of the production of seedlings, the substrate must guarantee, through its solid

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phase, the mechanical maintenance of the root system and plant stability. The substrates used in this system can be commercial or produced by the farmer from the use of residues generated in the property, the latter option represents a sustainable alternative for the reduction of the environmental impact caused by residues (KÄMPF, 2005).

The substrate is considered the most sensitive component since any variation in its composition implies the nullity or irregularity of germination, the malformation of the plants and the appearance of symptoms of deficiencies or excesses of some nutrients (MINANI, 1995).

The Southwest region of Paraná is one of the areas that produce the most turkey, with Francisco Beltrão as the largest producing city in Brazil. In this production chain, the turkey bed is the primary residue produced areas of turkey manure. In this sense, the use of turkey manure in the production of vegetable seedlings can be a good option for the use of manure and the creation of seedlings with more vigor and quality.

The objective of this work was to analyze the viability of the production of bell pepper (*Capsicum annuum* L) seedlings on polystyrene trays, with the addition of different doses of turkey manure in the substrate.

MATERIAL AND METHODS

The experiment was conducted in the experimental area belonging to the Faculdade Educacional de Dois Vizinhos - UNISEP - Union de Ensino do Sudoeste do Paraná, Câmpus Dois Vizinhos-PR, with Latitude of 25º 44 '01" S, "longitude: 53º 03' 26" W, altitude: 509m. The experiment was installed in August 2017 in protected cultivation.

The design of this experiment was the completely randomized design (DIC), consisting of five treatments four replicates of 30 plants each. The treatment consisted of the addition of turkey manure at 0% (control - without turkey manure), 10%, 20%, 30%, and 40% on commercial substrates. The commercial substrate used was Plantmax® containing up to 50% moisture, water retention capacity of at least 150%, pH 5.8, electrical conductivity 1.3 mS cm-1.

The cultivar to be sowed was Yolo Wonder by Feltrin®. Its characteristics are the cycle of 110 to 120 days, square format, the weight of 130 to 150 grams, size 12x11 mm, bright dark green color.

Sowing of the experiment was carried out in expanded polystyrene trays of 120 cells, which were filled with commercial substrate and the different concentrations of turkey manure. In each cell, two seeds were sown and after the germination, the thinning was carried out, maintaining one plant per cell.

The evaluations were carried out when the seedlings reached the age of planting with 2 to 3 final leaves. Ten randomly selected seedlings were selected for assessment and taken to the laboratory of plant physiology followed by washing in running water and with the aid of a stylet the root system was separated from the part of the plant, the cut was performed on the plant's lap. The evaluations were then carried out.

The analyzed variables were height (cm), which was obtained with the help of a ruler, measuring the distance between the plant's lap and the apical part of the plant. The root length (cm) was measured with the aid of a ruler by measuring the distance between the lap of the plant and the apical regions of the largest root. Fresh mass of the aerial part (g), to obtain this data the plants were weighed on a digital scale considering four digits after the comma. In order to obtain the dry mass of the aerial part (g), the plants were placed separately in KRAFT® paper packages and stored in a greenhouse with a temperature of 60ºC and kept in this environment until they reach the constant mass weight, afterward weighing in digital scale considering four digits after the comma. The number of leaves was obtained by counting the leaves, considering those fully expanded leaves.

The data submitted to analysis of variance (test F) and the treatments compared statistically through the statistical analysis program SIVAR (FERREIRA, 2000). A polynomial regression analysis was performed at the 5% probability of error level.

RESULTS AND DISCUSSION

For root length, there were no statistical differences, ranging from 5.13 to 5.30 inches in length. It should be taken into account the fact that the seedlings of the present study were produced in trays, which in a way may limit the development of the plant root system.

In (Figure 1) it is noted that the aerial results in function of different doses of turkey manure subjected to quadratic regression analysis type, adjusting significantly ($p \leq 0.01$) a function of 2nd grade, and R2 was adjusted to 0.84. It can be observed that there was an increase in the aerial part, and the maximum estimated technical efficiency occurred at the concentration of 30% turkey manure incorporated into the commercial substrate, with an average height of 19.4 centimeters.

The use of turkey manure added to a substrate allows greater availability of macro and micronutrients essential for the development of plants.

Camargo et al (2011) evaluated four sources of organic matter (turkey litter, bovine manure, chicken litter, and earthworm humus) in four proportions of the substrate composition (0, 20, 40 and 60%). In pinhão-manso with the concentration of 60% of organic matter in the substrate, there was an average difference of 10 cm in the height of plants in relation to the control, resulting also in the higher height of seedlings. Results that corroborate those obtained in this work, however, it was observed the positive effect on the height of plants with the addition of up to 20% turkey manure in the substrate.

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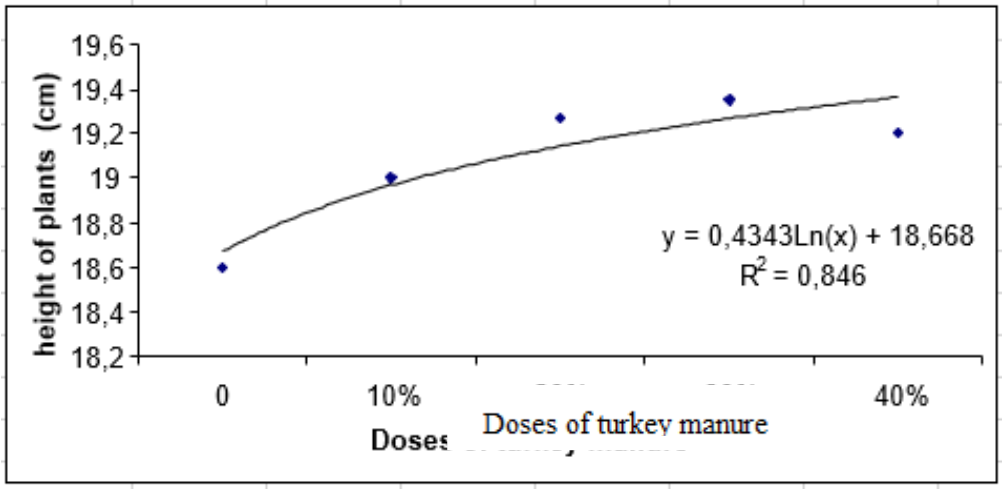

Figure 1 – Height of aerial part of bell pepper plants subjected to treatment with different doses of turkey manure. UNISEP – Dois Vizinhos – PR, 2017.

The result of different doses of turkey manure affects the number of leaves, subjected to a quadratic type regression analysis, adjusting significantly ($p \leq 0.01$) to a 2nd-grade function, with R^2 adjusted for 0.95. It can be observed that there was an increase in the number of leaves according to the rise in the dose, and the maximum technical efficiency occurred in the concentration of 20%, with a mean of 5.5 leaves per plant (figure 2).

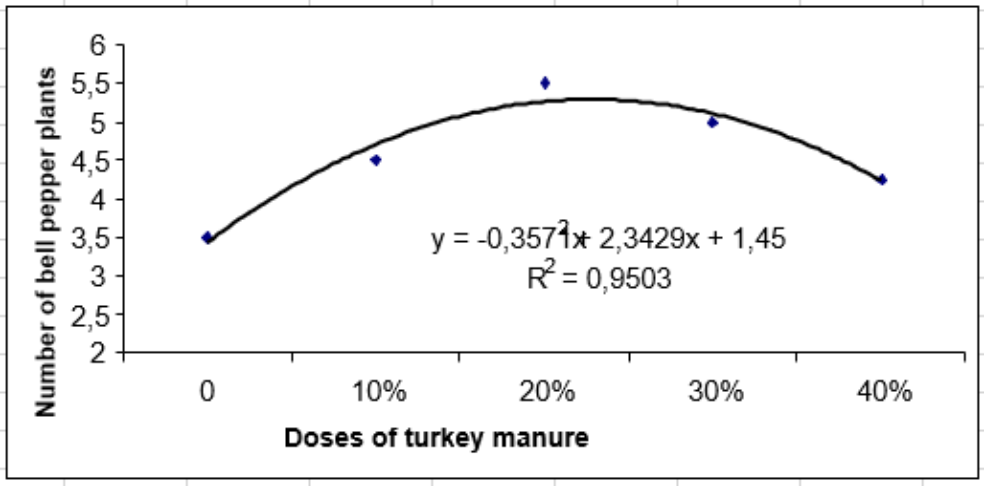

Figure 2 – Number of bell pepper plants subjected to treatment with different doses of turkey manure. UNISEP – Dois Vizinhos – PR, 2017.

The leaves in a plant are essential as they are directly related to the production of photoassimilates. Segundo Bellote; Silva, (2000), this characteristic is critical because the leaves are one of the main sources of photoassimilates (sugars, amino acids, hormones) and nutrients for adaptation of post-planting seedlings, which will require a good reserve of photoassimilates, that will serve as supply of water and nutrients to the roots in the first month of planting.

In the same way, we can observe in (figure 3) for the fresh mass of the aerial part in the function of different doses of turkey manure, submitted to quadratic type regression analysis, adjusting significantly ($p \leq 0,01$) to a function of the 2nd grade, and R2 was adjusted to 0.91. It can be observed that the fresh mass of the area was increased as the dose increased, and the maximum technical efficiency occurred at a concentration of 20%, with an average of 4.2 grams per plant.

Silva Junior et al. (1995) evaluated the feasibility of using turkey manure in the production of tomato seedlings that turkey manure could be used as an organic fertilizer in the soil-based substrate composition in the proportion of 5 to 10% for the production of Tomato seedlings.

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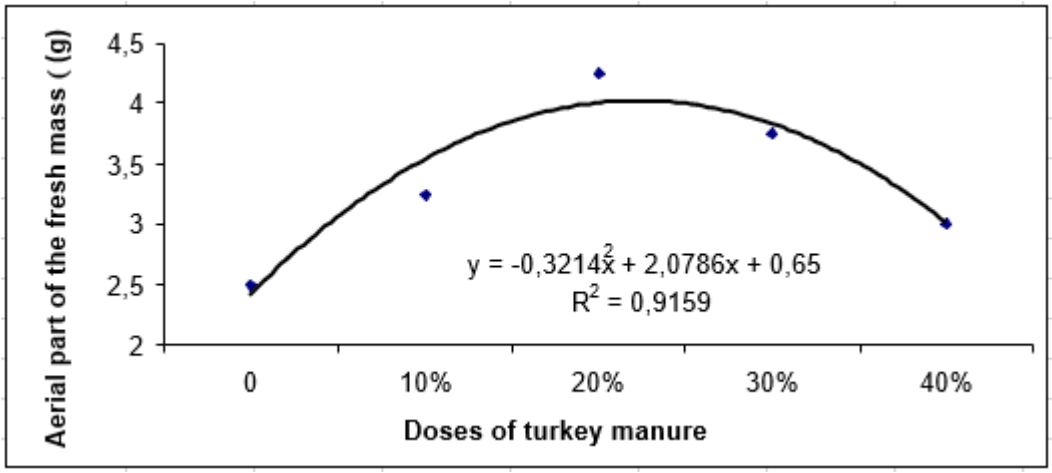

Figure 3 – Aerial part of the fresh mass (g) of bell pepper plants subjected to treatment with different doses of turkey manure. UNISEP – Dois Vizinhos – PR, 2017.

It can be observed in Figure 4, for aerial dry mass, as a result of different doses of turkey manure, submitted to a quadratic type regression analysis, adjusting significantly ($p \leq 0.01$) to a function of the 2nd degree, with R^2 being adjusted to 0.96. It can be observed that the fresh mass of the area was increased as the dose increased, and the maximum technical efficiency occurred at a concentration of 20%, with an average of 0.43 grams per plant.

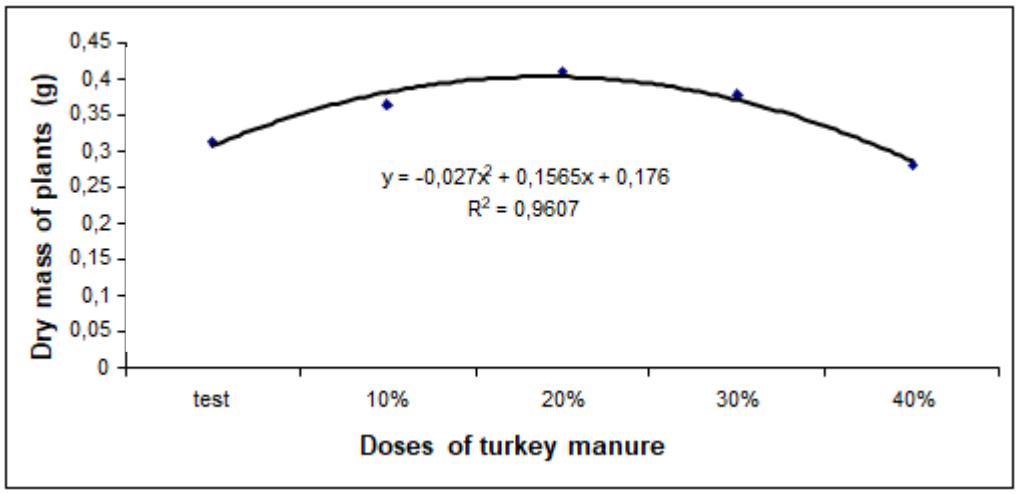

Figure 4 – Dry mass of bell pepper plants subjected to treatment with different doses of turkey manure. UNISEP – Dois Vizinhos – PR, 2017.

According to Brandão (2000), by looking at the mass of dry matter it is possible to know which substrate provided the greatest amount of nutrients for the seedlings. Filgueira (2005) affirms that a good rooting and the resumption of plant development after the shock of the transplant process is favored by tissues rich in dry matter.

In this way, the efficacy of the addition of organic turkey manure fertilizer in the production of bell pepper seedlings in trays conducted in a protected cultivation system is proved by the results obtained.

CONCLUSIONS

All growth variables and analyzed development with the exception of the root length, presented results that were satisfactory when the seedlings were subjected to planting with the addition of 20% turkey manure in the substrate.

Therefore, the use of turkey manure is efficient in the production of pepper seedlings in trays under protected cultivation. However, there is a need to develop further studies.

FUTURE WORKS

To evaluate the growth and development of pepper seedlings under saline stress.

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