Scientific Electronic Archives
Issue ID: Sci. Elec. Arch. Vol. 12 (5)
October 2019
DOI: http://dx.doi.org/10.36560/1252019815
Article link
http://www.seasinop.com.br/revista/index.php?journal=SEA&page=article&op=view&path%5B%5D=815&path%5B%5D=pdf
Included in DOAJ, AGRIS, Latindex, Journal TOCs, CORE, Discoursio Open Science, Science Gate, GFAR, CIARDRING, Academic Journals Database and NTHRYS Technologies, Portal de Periódicos CAPES.

Composting of coffee grounds and use of organic compost in growing carrots

J. B. Melo, A. V. Silva, J. F. S. Filho, K. C. Pereira, D. R. B. Wangem

Instituto Federal de Educação, Ciencias e Tecnologia Goiano - Campus Urutaí

Author for correspondence: jamerson1995@hotmail.com.br

Abstract: The consumption of the coffee beverage generates large amounts of sludge that can be converted into organic compost when composted. It evaluated levels of composted coffee grounds in the production of carrots. The experiment was conducted at the Goiano Federal Institute - Campus Urutaí, GO. A completely randomized design with 5 treatments was used: 0%, 25%, 50%, 75% and 100% of composted sludge and four replicates. The following parameters were evaluated: root length, plant height, MFR, root diameter, weight of (MSPA) and weight of (MSR). The results were analyzed using the SISVAR software, performed the analysis of variance and when significant differences were found the Tukey test was used to compare the averages, at 5%. The higher percentage of sludge provided greater development in most of the analyzed parameters. It was concluded that composite coffee grounds in the substrate, the plants showed good development, obtaining positive results.
Keywords: Daucus vulgaris, Coffea, compost, humic substances.

Introduction

Coffee (Coffea sp.) Is one of the most important and valuable agribusiness raw materials in the world and also one of the most consumed beverages (Ximenes, 2010). However, the large production and consumption of coffee originates a huge amount of waste, which has not been identified as potential equally important by-products (CRUZ, 2015).

These residues are diverse (pulp, rind, mucilage, waste water and in the process of extracting the coffee beverage an organic residue is still generated, the coffee grounds) and according to some authors have enormous potential for reuse due to their richness in nutrients and bioactive compounds (CRUZ, 2015).

As mentioned, among the byproducts there is sludge from roasted and ground coffee beans after extraction of hot water and / or pressure soluble substances during the preparation of the coffee or soluble coffee beverage. Usually, the generated coffee grounds are landfilled or burned as fuel in boilers of the instant coffee industry (FRANCA; OLIVEIRA, 2009).

However, through composting, coffee grounds can be transformed into stabilized organic fertilizer called organic compost (SOUZA et al., 2001). According to Fan and Soccol (2005), because it is a material rich in organic matter, macro and micronutrients, coffee grounds have potential for agricultural use as a fertilizer or substrate component for seedling production. In the scenario in which environmental conservation assumes importance in the impacts caused by human action on agriculture, it is necessary the knowledge, selection and adoption of good environmental management practices (VALARINI; RESENDE, 2007). Noteworthy is composting, a controlled process by which organic waste is biologically transformed, resulting in stabilized organic fertilizer called organic compost (SOUZA et al., 2001). Composting has several advantages, including a low operating cost process that enables the use of compost in soil fertility for agriculture, contributing to the reduction of air and groundwater pollution by

minimizing environmental contamination and improving soil quality. soil, (SILVA et. Al., 2002; LIMA et al., 2008).

The aim of this study is to evaluate the use of organic fertilizer from coffee grounds compost in carrot cultivation. Carrot (Daucus carota) is a vegetable from the Apeacea family of the tuberous root group, cultivated on a large scale in Brazil. This fruit tree has a high content of vitamin A (12000 IU / 100 g) soft texture and pleasant taste. In addition to fresh consumption, carrots are also used in industries that market them in the form of pickled vegetables, infant foods and canned instant soups (SAFETY AND QUALITY MANUAL FOR CARROT CULTURE, 2004).

Methods

The study was conducted at the Federal Institute Goiano - Campus Urutaí, located between the geographical coordinates: latitude, 17 ° 29 '16 ”S, longitude 48 ° 12' 38” W Gr. And altitude of 800 m, in the Fertility and Nutrition laboratory. of plants.

The experimental design was completely randomized with five treatments (0%, 25%, 50%, 75% and 100%) and four replications, which consisted of percentages (volume / volume) of organic compost produced from coffee grounds.

Composted coffee grounds were used to plant carrots. For 90 days, 150 liters of coffee grounds were composted. It was collected in the canteens of the institution and huddled in the shade. Every 5 days the material was rolled and moistened, thereby controlling the temperature to accelerate microbial activity and decomposition.

The composting process was followed for 70 days by regularly measuring the temperature with a digital thermometer as well as a mercury thermometer for better accuracy.

After the organic compost was prepared, the carrot seeds were planted using 20 5-liter plastic pots containing the soil and the percentages of composted coffee grounds. The parameters analyzed were: root length, plant height, root weight, root diameter, shoot dry weight and root dry weight. Statistical analysis was performed using the SISVAR software (Ferreira, 2011), and the analysis of variance was performed. When significant differences were found, the means were compared by the Tukey test at 5% probability.

Results and discussions

The results showed that, for the variable length of roots, the treatment constituted of 25% of sludge compost differed statistically from the other treatments, observing that there was greater root development.

It was observed that, for the plant height variable, there was significant difference only in the control with 0% sludge treatment in relation to the other treatments. There was no significant difference between 25%, 50%, 75% and 100% coffee grounds treatments. (Figure 1).

This result reinforces what Ferreira (2011, p. 6) found in relation to the cultivation of lettuce plants (Lactuca sativa L.), where good results were obtained “with an increase in biomass, photosynthetic pigments and leaf macronutrients, superior face. control plants ”using coffee in its composted form at doses of 15% or more.

The linear increase in fresh and dry mass of shoots and roots is due, among other factors, to the presence of humic substances capable of contributing to the improvement of the physical, physicochemical and biological properties of the substrate, as well as nutrients common in mature compounds. Among the favored properties we can mention the increase of water storage capacity by the substrate (SILVA and MENDONÇA, 2007).

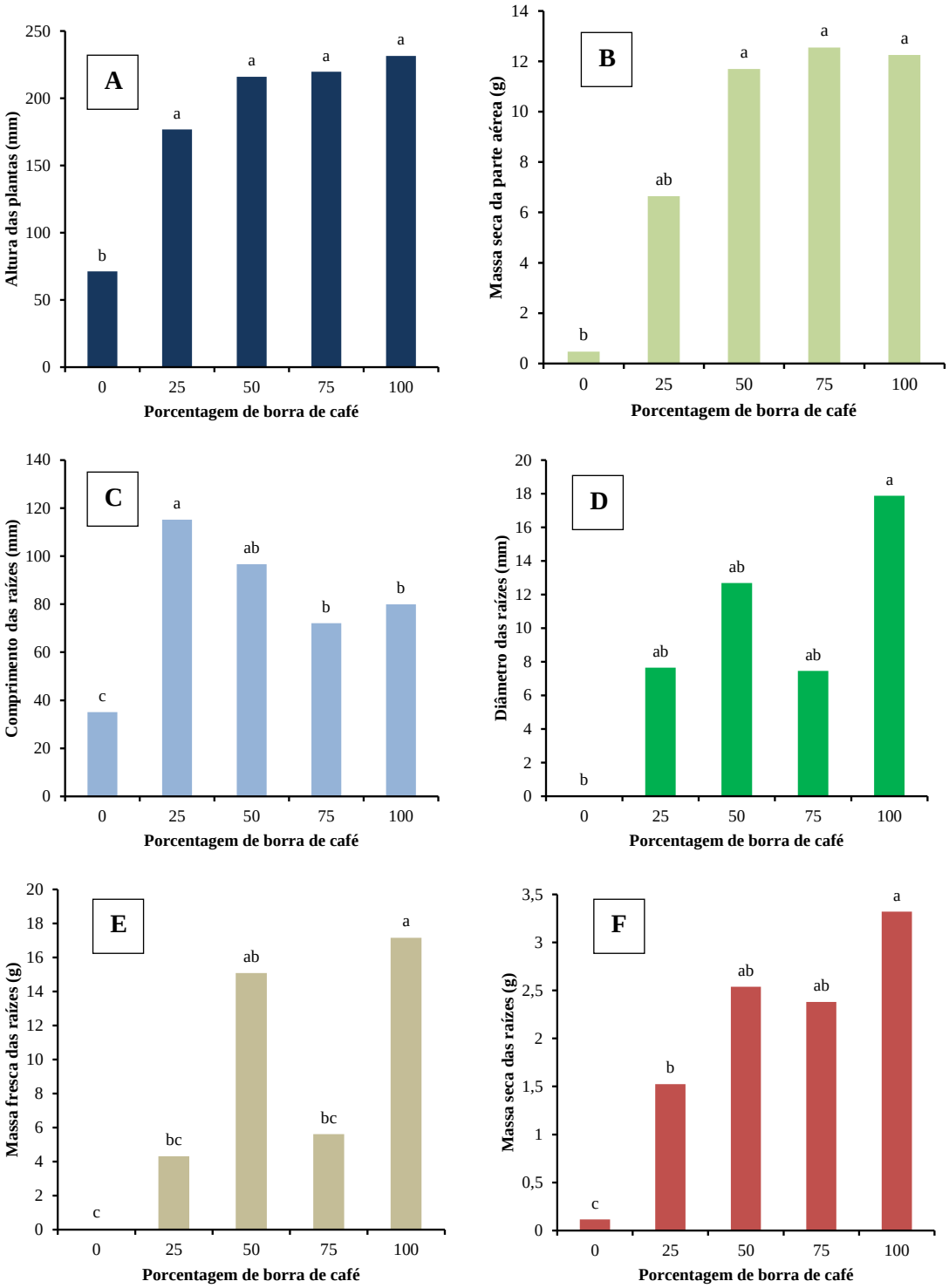

Figure 1. Plant height (A), shoot dry mass (B), length (C), diameter (D), fresh mass (E) and dry mass (F) of carrot roots submitted to growth using substrate with proportions of coffee grounds (means compared by the Tukey test at 5%)

Conclusion

The present study of carrot plant growth, using composted coffee grounds, showed that even with high levels of compost the plants showed good development, obtaining positive results. Therefore, it can be stated that the coffee sludge compost is an input with potential for use in carrot culture, providing its development with superior quality.

References

DANTAS, A.M. Materiais orgânicos e produção de alface americana. 2010.38f. Monografia (graduação) - Universidade de Brasília/Faculdade de Agronomia e Veterinária. Brasília, 2011**.**

DICKSON, S. The Arum-Paris continuum of mycorrhizal symbioses. New Phytology, v. 163, p. 87-200, 2004.

EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. Centro Nacional e Pesquisa em Solos / Humberto Gonçalves dos Santos et. al. Sistema Brasileiro de Classificação de Solos. 3 ed. Brasília, DF: Embrapa, 2013. 353p.

BRUNDRETT, M.; KENDRICK, B. The roots and mycorrhizas of herbaceous woodland plants. I. Quantitative aspects of morphology. New Phytology, v. 114, p. 457-468, 1990.

CARNEIRO, M.A.C.; SIQUEIRA, J.O.; VALE, F.R.; CURI, N. Limitação nutricional e efeito do pré-cultivo do solo com Brachiaria decumbens e da inoculação com Glomus etunicatum no crescimento de mudas de espécies arbóreas em solo degradado. Ciência e Prática, Lavras, v.19, n.3, p.281-288, jul./set. 1995.

CRUZ, S. A. F. Avaliação do potencial da borra de café fresca na mineralização do nitrogénio e do fósforo e em culturas hortícolas. Dissertação de Mestrado. Instituto Superior D'Agromonia – Universidade de Lisboa. Lisboa – PT, 2015.

FERREIRA, A. D. Influência da borra de café no crescimento e nas propriedades químicas e biológicas de plantas de alface (Lactuca sativa L.). Dissertação de Mestrado. Instituto Politécnico de Bragança – Escola Superior Agrária. Bragança – SP, 2011.

Ferreira, D.F. Sisvar: a computer statistical analysis system. Ciência e Agrotecnologia (UFLA), v. 35, n.6, p. 1039-1042, 2011.

FERROL, N.; BAREA, J.M. & AZCON-AGUILAR, C. Mechanisms of nutrient transport across interfaces in arbuscular mycorrhizas. Plant Soil, v. 244, p. 231-237, 2002

FURLANI, A. M. C. Nutrição mineral. In: KERBAUY, G. B. Fisiologia Vegetal. Rio de Janeiro: Editora Guanabara Koogan S.A., p. 40-75.

KIEHL, E.J. Novos fertilizantes orgânicos. Piracicaba: Agronomia Ceres, 2010.248p.

SILVA, I. R., MENDONÇA, E. R. Matéria orgânica do solo. *In*: NOVAIS et al. Fertilidade do Solo. Viçosa, MG: Sociedade Brasileira de Ciência do Solo, 2007. p. 276-374.

SOUZA, F.A. de; AQUINO, A.M. de; RICCI, M. dos S.F.; FEIDEN, A. *Compostagem*. Seropédida: Empresa Brasileira de Pesquisa Agropecuária - Embrapa Agrobiologia, 11 p., 2001 (Boletim Técnico, nº 50).

XIMENES, M. A. A tecnologia Pós-Colheita e Qualidade Física Organoléptica doCafé Arábica de Timor. 2010. 121f. Dissertação (Mestrado) - Instituto Superior deAgronomia, Universidade Técnica de Lisboa, Lisboa, 121p. 2010.