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Abstract

Application of Two Organic Fertilizers Obtained from Anaerobic Digestion of Pig and Cow Manure on Tomato and Chard Crops

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Abstract: Anaerobic digestion is a microbial degradation process of the organic matter, the principal product is the biogas which contains carbon dioxide and methane, and a byproduct, the digestate, which is the final liquid effluent and it has been used as a fertilizer. In this work was set up two 120 L biodigesters, one fed with cow manure, and other with pig manure, both designed at 7% dry solids basis; they were maintained at mesophilic conditions (25 to 35°C) during 78 days, the biogas production and methane content was monitored weekly. At the end of the experiment it was determined the phytotoxicity of the cow liquid digestate (CLD) and the pig liquid digestate (PLD) over lettuce seeds, and tested their efficiency as fertilizers in tomato and chard crop. They were applied on foliage at 50% and compared with: a commercial organic fertilizer (Ctrl+), a commercial phytohormones concentrate (FerA), and a control using only water (Ctrl). Only the anaerobic digestion of cow manure produced a flammable biogas (methane >40%). CLD and PLD were not phytotoxics at concentrations lower than 10% in lettuce seeds. For tomato crop, CLD showed the highest yield, getting 90% more performance than Ctrl and 16% more than Ctrl+, with a similar production cost. Using FerA and PLD was obtained similar yield between them and higher than Ctrl. While in chard crop, using the PLD was obtained the highest yield, getting 47% more performance than Ctrl and 63% more than Ctrl+; using CLD was obtained more yield than FerA, but less yield than Ctrl. Digestates were different depending on the organic matter used for the anaerobic digestion, and it could be used as fertilizers of different crops because each plant has different nutritional requirements.

Keywords: Anaerobic Digestion, Livestock Manure, Organic Fertilizer, Vegetable Crops

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