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Mini Review

Potential use of wastewater from sewage treatment plants in fertigation in Brazil

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Introduction

The volume of fresh water available for human use has drastically reduced, due to the significant population growth, intensification of use combined with the effective increase in pollution and the degradation of water bodies that still exist [1]. Water resource management becomes more sustainable the greater the use of wastewater. This behavior will contribute to increase the potential of drinking water, essential to the basic needs of human beings and to significantly reduce the release of effluents into water bodies, triggering as an advantage the reduction of pollutants in the environment and consequent protection of ecosystems Monte and Albuquerque [2]. According to Ortiz & Pinheiro [3], sewage is a combination of domestic effluents, industrial waste, effluents from commercial and institutional establishments, as well as agricultural effluents. The treatment of effluents generates two by-products, namely sludge and treated wastewater.

Urban wastewater is subject to variability in its chemical composition due to its location, the behavior of individuals and the season, variables that will directly reflect on its quality [4]. Regardless of the chemical variations of the sewage effluents, after its treatment, its base composition, as described by Costa [5], comprises the presence of organic matter, mainly resulting from the wastewater of the toilets and gray water, the result of the remaining use domestic, inorganic matter, such as salts, acids and bases, microorganisms and casually metals such as aluminum, cadmium, lead, chromium. Other compounds present are gaseous such as oxygen, methane, carbon dioxide and hydrogen sulphide. The treated effluent, despite going through several treatment steps, can still contain high levels of nutrients such as nitrogen and phosphorus. This amount of nutrients can be harmful in a receiving body of water, increasing its nutrient rates and favoring the growth of algae and cyanobacteria. However, this type of treated effluent, with adequate amounts of nitrogen and phosphorus, can be used to irrigate some crops as fertilizers.

The sanitary sewage treatment operational unit is commonly called Sewage Treatment Station (ETE), which receives pollutant sewage loads. The main objective of the ETE is to carry out the treatment of the effluent, using physical, chemical or biological processes in order to dispose of waste water treated with a minimum load of pollutants in the receiving body, reducing possible environmental impacts and meeting quality standards. required by law.

Conventional models of agricultural production recommend the use of mechanization and chemical inputs such as pesticides and mineral fertilizers, which quickly leads to the degradation of natural resources [6,7]. In order to increase productivity, it is common to use chemical fertilizers, which improve the chemical conditions of the soil by increasing crop productivity. However, these ongoing actions can promote negative environmental, economic, and social impacts such as contamination of soil and water and increase production costs. In view of this problem, a possible alternative for obtaining fertilizers is the use of wastewater from the Sewage Treatment Station (ETE) carried out through fertigation. According to Lacerda et al. [1], fertigation comprises the processes of irrigation and fertilization, simultaneously. Wastewater is a potential source of nutrients and organic matter when used in fertigation, contributing to increased soil activity [8].

Fonseca (2005) mentions that the treated wastewater provided by the ETE can be used as an alternative source for obtaining water. This product is also configured, according to its chemical properties, as a source of nutrients for the soil-plant system, as it contains macro and micronutrients essential to the development of plants. In agriculture, the use of treated sewage effluents has been

verified, as it enhances greater savings and preservation of fresh water, reduced costs with fertilizers and increased productivity and quality of agricultural crops [9]. In this case, the recommendation is based on the analysis of nutrients needed by the plant, associated with the supply of nutrients by the soil, through organic residues and / or by chemical fertilizers [10]. According to Sandri et al. [11], the use of treated wastewater in agricultural crops is important not only as an extra source of water, but also due to several other factors, such as serving as a source of nutrients. The reuse of this effluent also minimizes the environmental impacts caused by the disposal in the water body.

According to Gonçalves [12], fertigation with wastewater is the irrigation process that guarantees greater sustainability through the application of fertilizers, providing sustainable agriculture and increasing productivity. In irrigation, treated wastewater must meet agronomic and public health protection requirements. Designed to meet the water needs of plants, the water used for irrigation should not be conducive to substances that may affect its development and must transport elements that benefit its growth and strengthening. Of the compounds present in the effluent, those harmful to the development of crops are the excess of heavy metals, dissolved salts and sodium. The nitrogenous compounds, phosphorus, potassium, zinc and sulfur promote the nutrition of the plant submitted to treated wastewater. Regarding the content of microorganisms that indicate fecal contamination, public health requests that it be compatible with the type of exposure, human and animal, to which the irrigated products will be destined [2].

Studies carried out in the Teofilo Otoni in Minas Gerais, Brazil, indicate that the wastewater from the sewage treatment station in that city, in approximately eight hours of fertigation, is able to supply the needs of pastures (1.0 hectare) with nitrogen and phosphorus throughout the year

Conclusion

The treated water from the sewage treatment plants that are discharged into even water courses contains significant amounts of mineralized mineral nutrients that can be readily used by plants in fertigation. The development of the logistics of its use in Brazilian crops would be important as it would reduce the use of processed mineral nutrients, reducing the production cost of the crops, considering that 70% of the mineral nutrients consumed in the Brazilian crops are imported. Another point would be the reduction in irrigation of water consumption from sources and water courses that reduce each year in Brazil.

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