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USE OF "DENDROCALAMUS LATIFLORUS" BAMBOO AS A SUPPORT LAYER IN ANAEROBIC FILTER TO REMOVE BOD AND COD IN SANITARY EFFLUENT TREATMENT

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Abstract: The results of BOD and COD removal in an anaerobic filter using bamboo are presented and discussed in this work. The study was carried out in a full-scale Sewage Treatment Plant. The Station is equipped with a Septic Tank combined with an Anaerobic Filter. A bamboo support layer was developed on the filter to form biofilm for the development of bacteria. The evaluation was carried out over a period of 12 months and with the new support layer, the Sewage Treatment Plant achieved efficiency in the removal of BOD and COD, respectively 94.92% and 95.12%.
Keywords: Effluent treatment, BOD and COD removal, Anaerobic Filter, Support Layer, Bamboo

INTRODUCTION

Concern about the environment has been increasing as human actions cause changes in water resources. Even knowing that there has been an improvement in indicators in the coverage of the population with service from sewage systems, there is still a long way to go in the search and implementation of compact installations, with stable operation that minimize environmental impacts due to the discharge of effluents into receiving bodies (Oliveira, 2014; Chernicharo, 2016).

Anaerobic systems can present significant efficiency in the removal of organic matter and pollutants, in addition to occupying a compact space, being resistant to load, temperature and toxicity shocks (Arvin and Harremöes, 1990). According to Camargo (2001), the use of bamboo rings in anaerobic systems can promote the removal of 40 to 80% of the chemical oxygen demand.

In this work, the removal of BOD and COD from the effluent is evaluated using bamboo of the Dendrocalamus latiflorus type as a support layer, made in the form of meshes, in an anaerobic filter in a sewage treatment plant that combines this type of post-treatment with the septic tank.

OBJECTIVE OF THE WORK

To evaluate the efficiency of BOD and COD removal using Dendrocalamus latiflorus bamboo as a support layer in an anaerobic filter.

METHODOLOGY USED

The study was carried out on a full scale in a Sewage Treatment Station in the south of Minas Gerais, with a treatment capacity of 0.6 L/s consisting of preliminary treatment, septic tank and anaerobic filter. The use of bamboo as a support layer in the station's anaerobic filter was due to the analysis of results for the period from Aug/2018 to Feb/2019 of a filter that was not efficient in removing BOD and COD (Biochemical and Chemical Oxygen Demand). respectively) using number 2 crushed stone as shown in figures 1 and 2.

In February 2019, the supporting layer of crushed stone was removed and the new layer was constructed with bamboo poles as shown in figure 3. The bamboo poles were drilled alternately in the shape of a cross using a 15 mm diameter drill with spacings of approximately 25 cm in diameter. distance between holes for effluent percolation and biofilm formation. These rods were installed alternately in the form of meshes as shown in figure 03, with an approximate height of 1.20m.

RESULTS OBTAINED

After completion of the support layer in Feb/2019, within less than 30 (thirty) days, the emergence of biofilm was observed in the bamboo samples analyzed. In the first tests in March 2019, the ETE already showed significant efficiency, reaching efficiency in the removal of BOD and COD, respectively 94.92% and 95.12% as shown in figures 04 and 05. During the period presented, the ETE

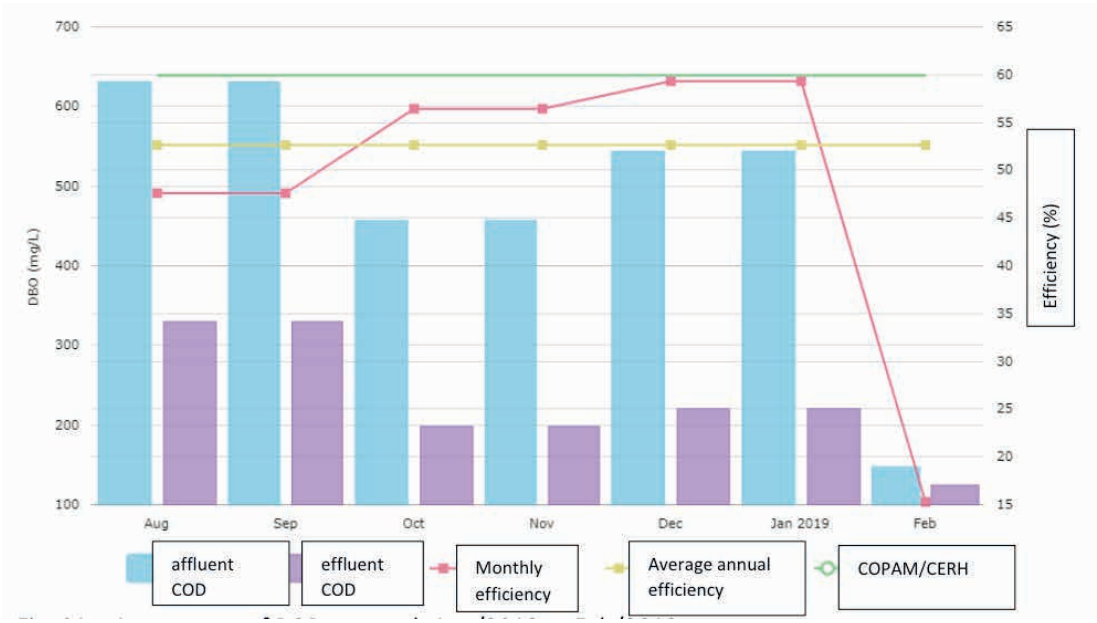

Fig. 01 – Assessment of BOD removal: Aug/2018 to Feb/2019.

Fig. 02\- Assessment of DQO removal: Aug/2018 to Feb/2019.

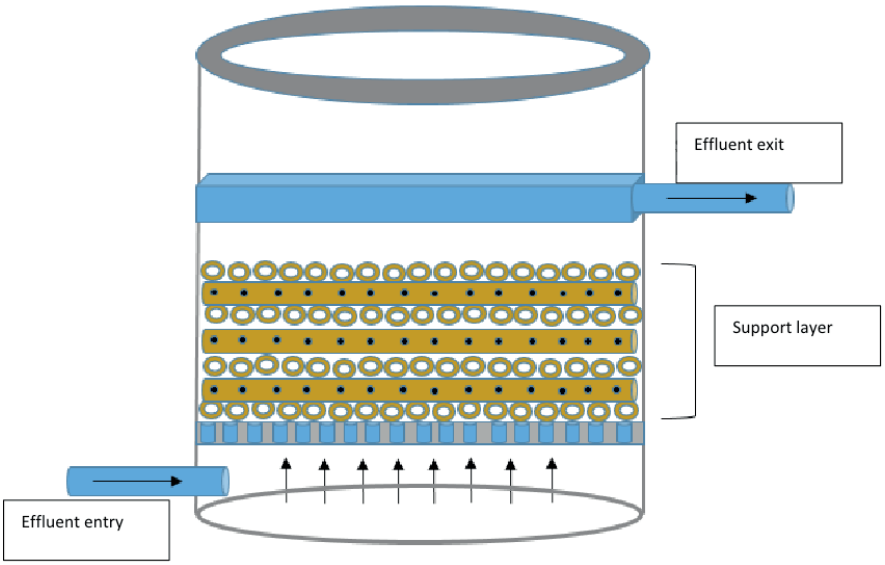

Fig. 03 – Assembly diagram of the bamboo support layer and effluent flow

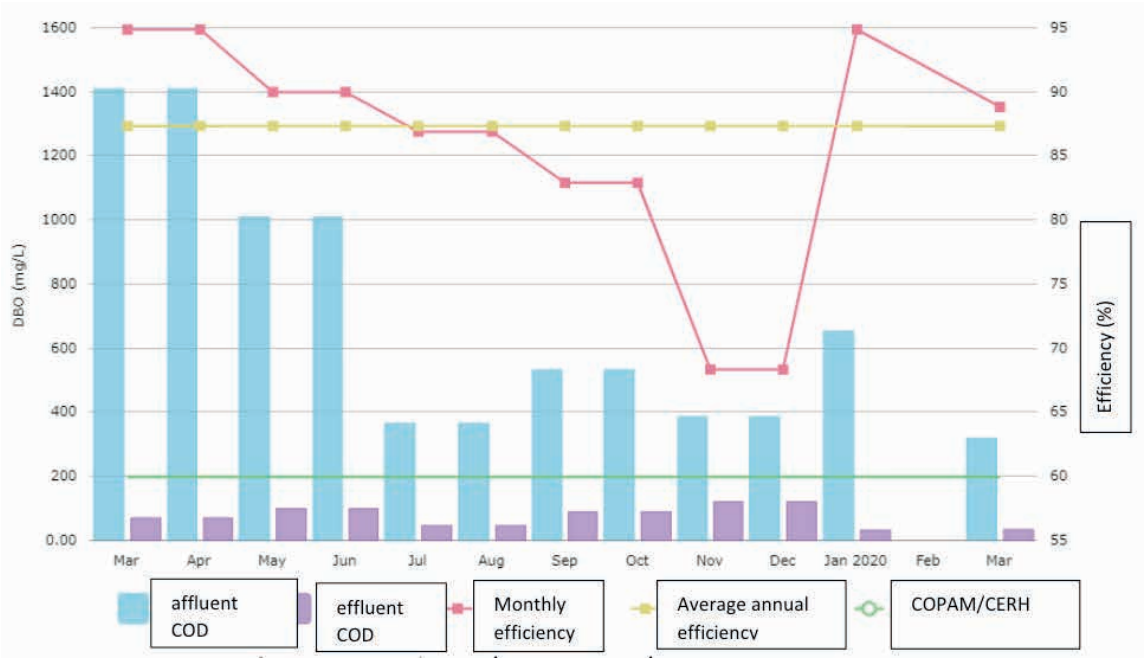

Fig. 04 – Assessment of BOD removal: Mar/2019 to Mar/2020.

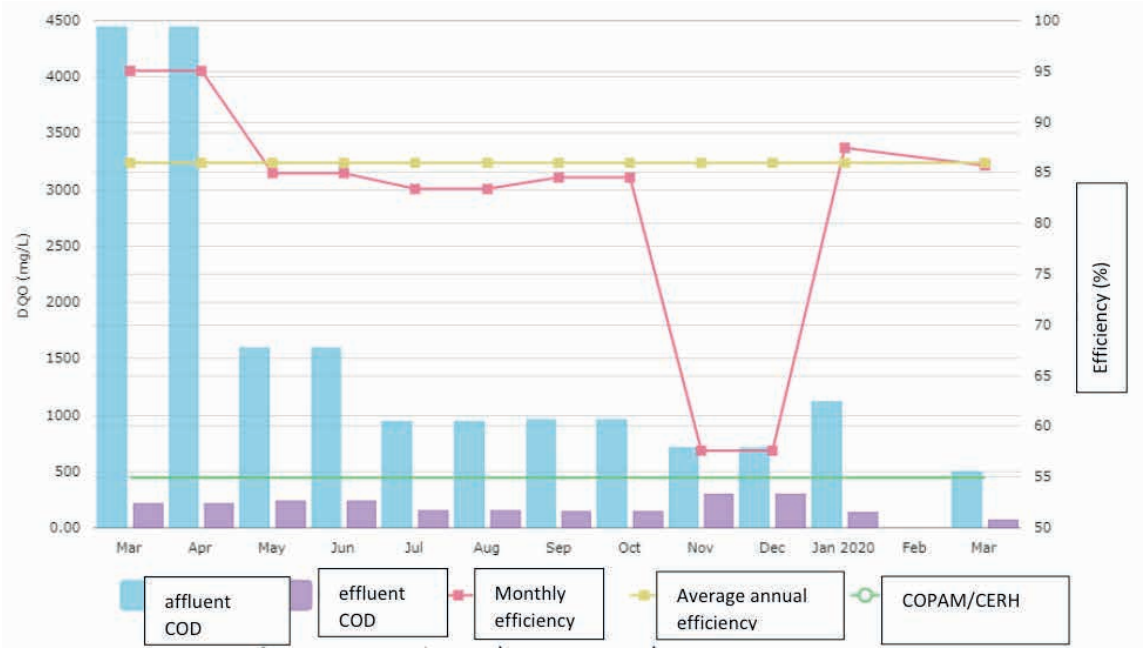

Fig. 05 – Assessment of DQO removal: Mar/2019 to Mar/2020.

Period	Average flow	Average BOD Affluent	Average Effluent BOD	Average COD Affluent	Average COD Effluent	Settleable Solids in Effluent	Average BOD removal efficiency	Average COD removal efficiency
	(L/s)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(ml/L)	%	%
aug/18	0,40	631,30	330,50	1.096,40	773,50	2,0	47,65	29,45
oct/18	0,55	457,20	198,90	759,10	429,90	0,1	56,50	43,37
dec/18	0,50	544,30	221,10	940,70	450,70	0,5	59,38	52,09
feb/19	0,50	148,00	125,30	305,30	279,90	0,1	15,34	8,32
mar/19	0,60	1410,30	71,70	4.445,00	216,90	0,1	94,92	95,12
may/19	0,57	1010,50	100,70	1.599,00	239,50	0,1	90,03	85,02
jul/19	0,60	366,10	47,80	947,00	156,50	0,1	86,94	83,47
sep/19	0,60	533,30	90,90	960,80	148,00	0,5	82,96	84,60
nov/19	0,90	386,38	122,15	713,50	302,00	0,3	68,39	57,67
jan/20	0,60	654,36	33,27	1.120,10	139,75	1,0	94,92	87,52
mar/20	0,60	320,41	35,66	502,75	71,50	0,1	88,87	85,78

Table 01 - Assessment of removal of biochemical demand and chemical oxygen demand

remained with an average efficiency of 87.39% for BOD removal, while for COD the result was 86.04%. The Results obtained during the study period are presented in table 01.

RESULTS ANALYSIS

The species of bamboo used was significantly efficient in removing BOD and COD in a short space between installation and analysis. This material, which is easily found in the southern region of Minas Gerais, can be applied at a very low cost. It can be seen that its structure favors the formation of the biofilm layer in its bed, guaranteeing a skillful removal of organic matter. Right at the beginning of the work, high values for the parameters analyzed at the entrance to the ETE were noticed, with anthropic action being investigated and, even so, in the treated effluent the data were favorable, maintaining consistency throughout the entire period. It is worth mentioning that even in rainy periods where rainwater contributes to the sewage, reducing the concentrations of organic matter upon arrival at the Treatment Station, State and Federal legislation was complied with.

CONCLUSIONS/ RECOMMENDATIONS

The low cost and use of the bamboo species Dendrocalamus latiflorus as a support layer proved to be efficient and brought the Sewage Treatment Station to meet release standards established by the State Council for Environmental Policy and Water Resources (COPAM/ CERH) thus ensuring the preservation of water resources.

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