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EVALUATION OF ENVIRONMENTAL POLLUTION LEVEL CAUSED BY THE FOOD INDUSTRY

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Introduction

Although industrial development contributes significantly to the economic well-being and development of a country, pollution caused by industrial activities can adversely affect human health and the environment. Industrial activities are an important source of water and soil pollution. Among the most polluting industries can be mentioned the chemical industry, metallurgy, food, transport, construction, industries which, in addition to the economic benefits they bring, but also contribute to the pollution of environmental factors: soil, water and mud. Depending on the industrial sector, the type of pollutants and the level of pollution of environmental factors differ. The dairy industry is one of the most polluting industries, not only in terms of the volume of effluents generated, but also in terms of its characteristics. It generates about 0.2-10 liters of effluent per liter of processed milk, with an average generation of about 2.5 liters of wastewater per liter of processed milk. Wastewater from the dairy industry contains large amounts of milk constituents, liquids containing a spectrum of organic chemicals and inorganic salts, as well as detergents and disinfectants used for washing, all of which contribute to increased concentrations of BOD_5 and COD. The main environmental problems related to milk production affect water, air and biodiversity pollution. To assess the environmental pollution degree by the dairy industry, effluents from the wastewater treatment plant (monthly) and stormwater (half-yearly) were collected and analyzed over a period of two years (2015-2017).

Materials and methods

For the wastewater samples the indicators pH, total dissolved solids (TDS), chemical oxygen demand (COD), bio-chemical oxygen demand (BOD5), total nitrogen (TN), total phosphorus (TP), sulphides, anionic surfactants and total oil and grace (TOG) substances with organic solvents were analysed, while for rainwater pH, total dissolved solids, COD, BOD_5, TOG and petroleum products were analysed.

Results and conclusions

The values parameters determined for the effluent samples discharged into the Barsa river were within the limits allowed by NTPA 001, which establish the maximum admissible limits for urban wastewater pollutants discharged into natural receptors, according to HG 352/2005, except for the values recorded for COD, BOD_5, total

nitrogen and total phosphorus. In the case of the suspended matter parameter, maximum values were registered for 2015 in March and May, for 2016 in January and for 2017 in January and beyond, but within the maximum limit allowed by NTPA 001.

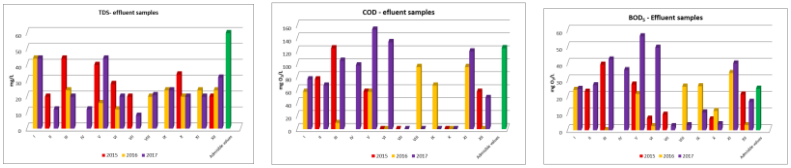

Fig.1. Evolution TDS, COD, BOD5 registered for effluent samples

The organic load was evaluated by analyzing COD and BOD_5 parameters. For the COD parameter, the values higher than the maximum allowed limits were registered in March 2015 and in May and June of 2017. The bio-chemical oxygen demand showed exceedances of the maximum allowed values both in 2015, in March and more than the year 2016, in August, September and November but also in February, March, April, May, June and November of 2017 (Figure 1).

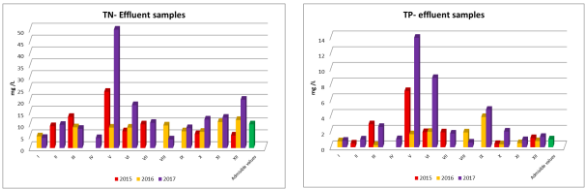

Fig. 2. Evolution TN, TP registered for effluent samples

Total nitrogen was within the maximum limits allowed by NTPA 001, with variations throughout the monitorization study, except for June in both 2015 and 2017, when much higher values were recorded compared to the allowed limit. For total phosphorus parameter, the registered values indicated exceedances for the vast majority of determinations, the highest values being presented in May 2015 and in May, June and December of 2017 (Figure 2).

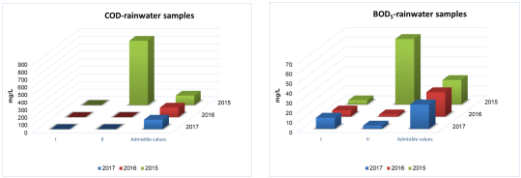

Fig.3. Evolution of COD and BOD5 registered for effluent samples

In the case of the rainwater sample, the only exceedances were recorded for the COD and BOD_5 parameters in 2015 on semester 2, indicating a significant organic loading (Figure 3).