J. Biol. Res. 2010 n.1 - Vol. LXXXIII

Removing the pollution load of manure by mixed bacterial cultures and environmental yeasts

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This paper reports on the behavior of the yeasts *Sporobolomyces salmonicolor* and *Sakaguchia dacryoidea* and of the mixed bacterial culture Bulab 5733 in cattle manure. This study was set as a target to verify whether the treated manure-containing wastewaters undergo a biological attack aimed at reducing the pollution load. In particular, we wanted to assess the ability of the nitrate-assimilating strains considered in order to drop down nitrogen-containing organic matter present in the manure-rich slurry contained into the sewage treatment plant working in the countryside of Arborea (SIPAS treatment plant). The batch tests performed in Erlenmeyer flask were carried out on freshly obtained slurries, and on the same, supplemented with glucose (2%) as an additional energy and carbon source. Both effluents were treated with the mixed bacterial culture Bulab 5733 (containing among others Bacillus, Pseudomonas and Streptomyces) and the yeasts *S. salmonicolor* and *S. dacryoidea*. The investigated parameters were: COD, TOC, NH_4^+, NO_2^-, NO_3^-.

The study carried out on freshly obtained slurries showed that, as regards the abatement of COD, the highest values in terms of removal percentage were obtained with both yeasts compared to bacterial culture, while the latter showed a more pronounced reduction in terms of TOC.

The survey on the presence of nitrates and nitrites did not give significant results, since these ions are only present in trace amounts, as is expected, and moreover no any production of these was observed during the studied biological treatment process.

We also noted that the ammonia nitrogen removal in freshly obtained slurries is similar in the case of *S. salmonicolor* (48,24%) and *S. dacryoidea* (45,93%) and lower with Bulab 5733 (35,14%).

The behavior of the cultures in the case of slurries implemented with 2% glucose showed a greater capacity of pollution abatement for all the considered strains. In particular it was noted that the ammonium removal increases with Bulab 5733 (79.22%), followed by *S. salmonicolor* (60,30%) and *S. dacryoidea* (46,13%) as shown in Figure 1. However in glucose-supplemented slurries, *S. salmonicolor* became largely ineffective with respect to organic matter removal, while on the contrary *S. dacryoidea* showed a much higher capacity for removal (75,05% for COD and 47,69% for TOC, see Fig.)

In conclusion, adding a supplementary, readily utilized carbon source such as glucose enhances reduction of pollution load by yeasts and bacterial mixed culture, with the additional observation that *S. dacryoidea* seems to be insensitive toward an increase of the C/N ratio, electing this strain as an ideal candidate for treatment of a "strong" wastewater. Therefore, the results lead us to believe that better performance can be achieved by subjecting the wastewater to a sequential treatment by the considered strains.

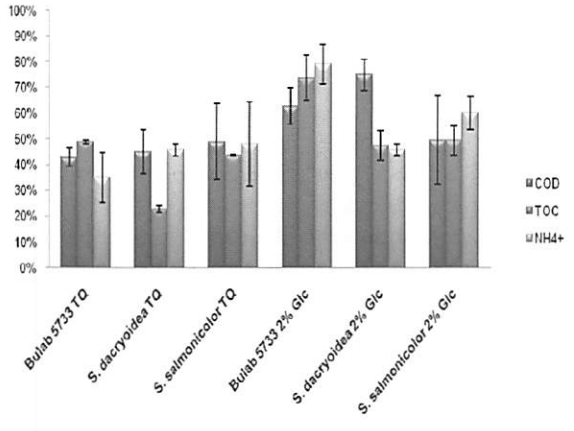

Figure - Abatement of organic matter and ammonia nitrogen in treated wastewater