

to determine the presence and abundance of biotechnologically useful bacteria (nitrifiers, denitrifiers) in the sludge granules samples. The samples were subjected to PCR amplification using the following primers: specific for ammonium oxidizing bacteria; specific for nitrite oxidizing bacteria; universal bacteria primers. The results indicated the presence of nitrifying bacteria specific genes belonging to *Nitrosomonas* sp., *Nitrospira* sp., and *Nitrobacter* sp., species responsible for nitrification. The abundance and diversity of identified microbial species were correlated with the treatment performances registered for the operational sequencing batch reactor.

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### Allelopathic effect of aqueous extracts from *Datura stramonium* on germination and plant growth of maize plants



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The study aimed to highlight the allelopathic effect of aqueous extracts of *Datura stramonium* produced on corn plants. Weeds cause substantial production decline in agriculture through direct and indirect effects. The importance of this paper is conferred both by studied crop and species *D. stramonium* considered ruderal weed, but in recent years is present sporadically in maize. The research was carried out under laboratory conditions. Each extract containing 100 g dried material was added to 8000 ml of distilled water and placed on magnetic stirrer for 24 h, after which filtration was carried out. From this extract three concentrations were made (20%, 50% and 80%). The experiment included 10 variants, in three repetitions. The researches revealed that aqueous extracts of *D. stramonium* plants exerted an allelopathic inhibitory effect on maize plants. The highest quantity of tropane alkaloids is found in the extract from the Jimsonweed leaves. In the variants treated with the extract were recorded the lowest values on germination (40%) and plant height of maize (5.57 cm), negative results are very significant compared to the control. In second place were situated Jimsonweed stems extract. The lowest quantities of hyoscyamine and scopolamine were found into the root.

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### Bioindicators of community structure in microalgae-bacteria processes



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For many decades, microalgae biomass has been representing a valuable resource for anthropic ecosystems. An important step was achieved in microalgae-based technologies field once with finding that relationship established between microalgae and activated sludge could revolutionize conventional wastewater treatment systems, with establishment of the sustainable treatment strategies. In conventional activated sludge processes, protozoan species represent indicators of the operating conditions and treatment

performance. However, low level of knowledge was found to be addressed to bioindicators in microalgae-bacteria processes. Thus, the study focused on investigating protozoa dynamics during low-strength wastewater treatment using microalgae-bacteria system. Experiments were performed using a photobioreactor operated in sequential batch operation mode. During the first treatment batches, protozoan community was characterized by a high species richness represented by ciliates and testate amoebae, small free-swimming ciliates being the prevalent taxa- diversity comparable with that reported in the early stage of the activated sludge development. A transition stage of the protozoan community followed once with biomass development, the disappearance of testate amoeba and development of stalked ciliates populations being noticed. However, a reduction of species richness was recorded after transition stage, a tendency that has led to a complete elimination of the protozoan community. Taking into consideration operating conditions, it was concluded that microalgae-bacteria processes are different from those of activated sludge regarding protozoan community structure. However, microalgae-bacteria processes sustained the development of metazoan community, a high abundance of rotifers populations being recorded at the end of experiments.

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### Arsenic accumulation and toxicity in arsenic-resistant and non-resistant plant species



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Tailings of Vale das Gatas mine (Northern Portugal) contain high concentrations of arsenic (541–5770 mg/kg) and heavy metals such as lead and zinc. Colonizing plants, such as *Agrostis castellana* Boiss. & Reut., may have developed resistance to these metal(loid)s. The average values of arsenic concentration in *A. castellana* range from 13.2 mg/kg (stems) to 30.9 mg/kg (leaves). Due to the chemical similarity, phosphate and arsenate can compete either for the same adsorption sites on soil particles, either by the same absorption mechanisms by the roots. In this study, plants of *A. castellana*, resistant and nonresistant to arsenate, were tested in relation to As(V) ion as a possible damaging agent of root membranes *in vivo*. The tolerance to As(V) was tested by a “root growth test” on specimens from the tailings, with reference to a sensitive population collected outside the mine influence. The tolerance index is the ratio of the average “maximum roots growth” in the presence of As(V) and the average “maximum roots growth” in the absence of As(V) to several arsenic concentrations (10, 20, 40, 80, 160, 320, 640, 1280 μM). The results allow verifying tolerance indices significantly higher in specimens that grow up in tailings (59.3% maximum), compared with specimens from non-contaminated areas (29.5% maximum).

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