Imprimir

[Cod. Trabalho: 121]

INDUSTRIAL & ENVIRONMENTAL BIOTECHNOLOGY

Microbial Degradation: Wastes and Effluents

SELECTION OF MICROALGAE FOR GROWTH IN SUGARCANE VINASSE

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Palavras-chave: biofuel;biorefinary;genetic resources

Resumo:

Sugarcane vinasse is an ethanol distillation byproduct produced at proportions of 10-15L per liter of ethanol. Due to its low pH and high chemical and biochemical oxygen demands (COD and BOD, respectively) it is considered an environment pollutant and cannot be directly disposed in aquatic environments. Microalgae are recognized as a promising alternative source for biofuels production and can be grown using wastewater and carbon emissions from industrial plants. Considering this characteristic, microalgae can be used in a bio refinery strategy for oil production associated to production of other microalgae-derived products, such as pigments, animal fed and/or fertilizers. This strategy could be applied in an industrial plant using the vinasse and the CO2 produced during the ethanol distillation. Studies focusing in the vinasse pretreatment, through clarification or anaerobic bio digestion, in order to favor microalgae growth have been reported. However, research programs aiming the selection and adaptation of microalgae strains for growth on untreated vinasse are not available. In here we show the screening of Brazilian microalgae strains (n=40) deposited in Embrapa´s collection for growth in vinasse. Two parallel strategies have been used: I) Vinasse gradient agar plates; II) Vinasse liquid media. The incubation conditions were 18h/6h light/dark cycles at 16.000 Lux at 30 degrees Celsius. In the first approach, unialgae strains were shown in agar plates containing linear gradients of vinasse (0-100%) in BBM or BG11 medium. In the second approach the same strains were grown under concentrations of 25%, 50% and 75% vinasse diluted in distilled water using aerated flasks (5L/h of atmospheric air). In the first approach, one strain was selected, the LBA8, that was capable of growing in the entire plate surface. In the second approach, it was possible to select four strains capable of growing at 75% vinasse concentration: LBA39, LBA32, LBA40 and also LBA8. In a first evaluation, all selected strains were identified as green algae (Chlorophyta) species. The selected strains were submitted to cultivation in aerated flasks containing 100% vinasse for 8 days for biomass productivity measurements. The following measures were taken for each strain: biomass productivity / biomass yield. The results for LBA8 were, respectively: 370 mg.d-1.L-1 / 2 2.62 g.L-1; The results for LBA32 were, respectively: 440 mg.d-1.L-1 / 3.10 g.L-1; The results for LBM39 were, respectively: 360 mg.d-1.L-1 / 2.50 g.L-1; the results for LBM40 were, respectively: 360 mg.d-1.L-1 / 2.52 g.L-1. The findings presented here demonstrate that highly productive microalgae strains can be cultivated in pure untreated vinasse.