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The production and application of biofloculants and their nanoparticles in dairy wastewater treatment

Adeleke R Oluwakamiye
University of Ibadan, Nigeria

One of the most pervasive and challenging problems faced by dairy industries is the availability of clean water, reclamation of wastewater and its discharge. This challenge requires modern biotechnological and the fast-growing nanotechnological approaches as robust and newest methods of treating and purifying water at lower cost with less energy in production industries, while at the same time minimizing the use of chemical flocculants and the deleterious health and environmental effects. Biofloculants, and its silver and magnetic nanoparticles were produced and applied in dairy wastewater treatment. The flocculating activity of all the isolates ranged from 12.14-85.39 % in which *Bacillus subtilis* B2 had the highest flocculating efficiency (85.40%). The best three with high flocculating efficiencies were selected for further studies and production of nanoparticles. They were *Bacillus subtilis* B2 (85.39%), *Fusarium sp.* F6. (81.30%) and *Bacillus licheniformis* B5 (70.88 %). The application of the biofloculant nanoparticles brought about a reduction in BOD, COD, TSS, TDS, pH, Salinity, Conductivity and turbidity with percentage reduction ranging from 1.11% - 44.17% for BOD, 16.12–71.44% for COD, 7.61–83.70% for TSS, 2.02%–74.94% for TDS, 4.8–6.2 for pH, 2.38%-85.20% for salinity, 15.25%-85.69% for conductivity and for turbidity 2.56%-85.09%. Metal content reduction ranged from 2.91%-71.46% for Fe, 6.15%-95.38% for Cu and 12.57%-97.96% for Zn. Fourier transform infrared spectroscopy revealed the carboxyl (COH) and hydroxyl (OH) group that gave rise to reduced and stable nanoparticle biofloculants. Scanning electron micrograph showed their crystalline fluffy structures, dendritic nature in different shapes and sizes.

Biography

Adeleke R Oluwakamiye is a first-year PhD student in the Biotechnology and Industrial Microbiology program, University of Ibadan, Nigeria. where she is working to proffer solution to the seemingly unending problem faced by industries in the reuse and discharge of wastewater. She is interested in employing a biotechnological and nanotechnological approach in mitigating and recycling wastewater discharge from factories/industries.

rachaeloluwakamiye@yahoo.com

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