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Removal of Amoxicillin and Sulfanamide by Freshwater Bacteria in Sri Lanka

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Abstract

Antibiotics are an important group of pharmaceuticals used in human and animal health care. Most of the antibiotics are prone to release to the environment due to improper usage. This has resulted in bacterial resistance development and toxicity in aquatic communities. Present study reports the biodegradation of amoxicillin (AMX) and sulfanamide (SUF) by *Bacillus cereus*, *Enterobacter ludwigii* and *Enterobacter* sp. strains which were previously reported as crude oil degraders. Different concentrations of AMX and SUF (0, 60, 120, 180, 240, 300, 360, 420 ppm) were used to detect minimum inhibition concentration (MIC) by standard pour plate method. AMX and SUF degradation kinetics were studied by introducing 0.5 ml of overnight starved bacterial suspensions into sterile antibiotic medium in triplicate at final concentration of 60 and 120 ppm respectively. The samples were incubated at 28^o C shaking at 100 rpm and 0.5 ml sub-sample aliquots were removed at two days interval for a period of 14 days. Analyses of antibiotics were performed by high performance liquid chromatography (HPLC). The MIC values for SUF and AMX were detected as 240, 420 ppm for *B. cereus*, 120, 360 ppm for *E. ludwigii* and 180 and 300 ppm for *Enterococcus* sp. respectively. After 14 days of incubation complete removal of AMX and 80% degradation of SUF was recorded by bacterium *B. cereus*. *E. ludwigii* showed 75% degradation of AMX and 60% degradation of SUF where *Enterobacter* sp. showed degradation of both AMX (80%) and SUF (70%) respectively. Thus, the present study illustrate antibiotics degradation potential of microbial community is important to understand their role in removal of antibiotics from the natural environment.

Keywords: Biodegradation, Minimum Inhibitory Concentrations (MICs), Amoxicillin, Sulfanamide, *Bacillus cereus*, *Enterobacter ludwigii*, *Enterobacter* sp.