

Treating of palm oil mill effluent using *Commelina nudiflora* mediated copper nanoparticles as a novel bio-control agent

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ABSTRACT

Nanoparticles research has been gradually increasing day by day in different aspects due to their potential physico-chemical and biological properties. In the present study, we synthesized 'green' copper nanoparticles (CuNPs) using *Commelina nudiflora* aqueous extract and analysed their biological application on the palm oil mill effluent treatment (POME) and microbial growth control. Synthesized CuNPs were spherical in shape with the average size of 45–100 nm measured by field emission scanning electron microscopy. X-ray diffraction results revealed that the biosynthesized CuNPs were crystalline in nature with higher purity. In addition, we demonstrated the effect of CuNPs on the reduction of COD concentration and microbial populations in the CuNPs treated POME and control samples. The bio-synthesized CuNPs were chemically stable with larger surface area and volume ratio resulting significantly reduced the microbial population in CuNPs treated POME. Also, the COD removal efficiency was increased by increasing CuNPs concentrations. The maximum microbial growth control and COD removal were noted at 1000 ppm in the POME waste. The results indicate that CuNPs can be used as a potent source for degrading the organic waste and reducing the microbial growth in the POME waste. Therefore, we suggested that green synthesis of CuNPs could be a major contributor in POME treatment in the near future.