International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

Green Synthesis of Iron Nanoparticles from *Cynodon* dactylon Weed and Antimicrobial Studies against Streptococcus Mutans and Escherichia Coli: As an Alternative Approach for Sustainable Development.

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Abstract

Metal nanoparticles are being increasingly used in many sectors of the economy and there is growing interest in the biological and environmental safety of their production. The conventional methods for nanoparticles synthesis are chemical and physical approaches that are often costly and potentially harmful to the environment. In past few decades, green synthesis of nanoparticles have caught the attention of many researches around the world as an alternative, efficient, inexpensive, and environmentally safe method for producing nanoparticles with specified properties. A number of valuable medicinal plants and other trees are being explored for the synthesis of metal nanoparticles.

Green synthesis of the metal nanoparticles basically involves the bioreduction of metal salts to the metal nanoparticles. Eventual peeling of green canopy (useful) for green synthesis of nanoparticles may lead to ecological imbalance. To overcome these adverse effects, we attempted to exploit weeds which are otherwise neglected and considered as waste. Synthesis of iron nanoparticle was accomplished by reducing Fe ions present in the aqueous solution of ferric chloride complex extracted from *Cynodon dactylon* leaves. *Cynodon dactylon* also commonly known as Bermuda grass, dūrvā grass, dubo, dog's tooth grass, Dhoob grass is considered as undesirable plant and a problem for farmers.

The synthesis of iron nanoparticles, as confirmed by UV-vis, SEM and FTIR spectroscopy and zeta potential studies, showed that leaf extracts of *Cynodon dactylon have* good potential for synthesizing stable iron nanoparticles. Antimicrobial studies of these synthesized FeNp were against modal gram negative organism *Escherichia coli*, and *Streptococcus mutans* as a gram positive modal by studying the zone of inhibition, MIC, MIB and Scanning electron microscopy.

The results of our study suggest that Cynodon can be effectively used to synthesize iron nanoparticles, which can make this unwanted weed a promising prospective alternative expression system to medicinal plants in green synthesis of nanomaterials, thus promoting sustainable development. The antimicrobial studies of green synthesis of the Fe nanoparticles manifested its antimicrobial properties against *S. mutans* were more when compared to *e.coli* and