

## IRON OXIDE NANOPARTICLES TO BREAK THE TUBERS DORMANCY OF THE WORLD'S WORST WEED THE CYPERUS ROTUNDUS

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### ABSTRACT

Purple nutsedge (*Cyperus rotundus* L.) is a persistent and prolific weed competing with crops for natural resources, results in heavy losses of crops. Phenols present in the tubers control the germination of tubers. Degrading the phenol break open the dormancy and induce the germination of all buds present in the tubers at once. Once tubers are germinated, it can be controlled by either chemical or cultural means results in reduced weed seed bank size. The novel magnetic iron oxide nanoparticles (nano-adsorbent) is quite efficient for degrading phenols present in the *Cyperus rotundus* tubers. A laboratory experiment was carried out at the Department of Nano Science and Technology, Tamil Nadu Agricultural University, Coimbatore to break the dormancy of *Cyperus rotundus* tubers using Iron oxide nanoparticles by degrading the phenols. The Iron oxide nanoparticles were synthesized by chemical precipitation method and characterized by Fourier Transform Infrared Spectroscopy (FTIR), X-Ray powder Diffraction (XDR) and Transmission Electron Microscope (TEM). Iron oxide nanoparticles at the concentration of 3.0 g kg tubers<sup>-1</sup> recorded higher percentage of phenol degradation i.e 89.0 per cent over control, which was on par with 2.5 g kg tubers<sup>-1</sup> i.e. 87.1 per cent over control. Advanced oxidation processes (AOP) are widely used for the removal of recalcitrant organic constituents such as phenols. In the case of the AOPs, the generation of hydroxyl radicals takes place through a catalytic mechanism in which the iron oxide nanoparticles play a very important role in phenol degradation. By the way of breaking dormancy factor, the germination percentage of the iron oxide nanoparticles treated *Cyperus rotundus* tubers was increased.

**KEYWORDS:** Cyperus Rotundus, Dormancy, Germination, Iron Oxide Nanoparticles, Weed