

Public Abstract

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Department:Electrical Engineering

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Title:DESIGN AND CONSTRUCTION OF HELMHOLTZ COIL FOR BIOMAGNETIC STUDIES ON SOYBEAN

A Helmholtz Coil with a large usable area of uniform field was designed, constructed and characterized, specifically for Bioelectrics studies. The design and analysis of the coil were carried out through experiments and the use of industry standard electromagnetic software suite. The location and the area that would have uniform field intensity were determined through simulation and compared with measurements.

The effects of magnetic fields on soybean germination rate were studied using the lab designed Helmholtz coil. A specific soybean variety, code named Magellan, was used for analysis. Experimental results indicate that presoaked soybean seeds when treated under static low intensity and extremely low frequency magnetic fields show improved growth and germination rates when compared to those grown under earth's geomagnetic fields. The extreme-low-frequency (ELF) AC magnetic field is more conducive to Soybean germination compared to the static magnetic field. An alternating magnetic field of 60 Hz was shown to have a statistically significant effect on soybean seed germination. Results have also shown that magnetic fields influence soybean germination more than electromagnetic fields from an anechoic chamber and a TEM cell.

The magnetic field may provide a feasible non-chemical solution in agriculture, and thus offers advantages over chemical methods in terms of environment protection and safety for the applicator. Further study is needed to determine at the molecular level the main reason for this phenomenon.