

## Quantitative Analysis of Plant Growth Exposed to Electric Fields

Hussein Ahmad<sup>1\*</sup>, Mohd Hafizi Ahmad<sup>2</sup>, Noor 'Aliaa Awang<sup>2</sup>, Izzah Hazirah Zakaria<sup>2</sup>

<sup>1</sup>Department of Electrical Power Engineering, Faculty of Electrical and Electronic Engineering, Universiti Tun Hussein Onn Malaysia, 86400, Pant Raja, Batu Pahat, Johor, Malaysia

<sup>2</sup>Institute of High Voltage and High Current (IVAT), Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia.

\*Corresponding author, email: hussein@uthm.edu.my

### Abstract

Electromagnetic radiations present in the environment has a profound effect on the growth of vegetable plant primarily grown under the high power transmission lines. The high electric field generated due to the ultra high voltage causes the increase and reduction in the size of the plants. Numerous research has been carried out to investigate the effect of electric field on the plants. However, the knowledge in term of quantitative analysis on the effect of electric field on the growth of vegetables is not entirely understood. Thus, this paper presents a study conducted to investigate the effect of high voltage DC electric fields on the young vegetable growth namely 'Choy Sam' and bean sprout. The experimental setup was designed which composed of two parallel plate electrodes. An electric field intensity of 38 kV/m was supplied between those two plate electrodes, and it was applied to the young vegetables. This research was focused on the percentage of germination and growing rate of young vegetables. The experiment was divided into two parts. The first part was to test whether there was an effect towards young vegetables exposed to or not exposed to electric fields. The second part of the experiment was to test the effect of electric fields treated water towards young vegetables. The numbers of seed, temperature and relative humidity were controlled. The changing of vegetables was observed for 8 hours per day for two weeks (Choy Sam) and one week (bean sprout). The growth of the young vegetables during exposure was calculated by using statistical methods. The analysis of the results showed that the electric fields and the electric fields treated water have influenced the germination rate and height of stems of both young vegetables causing the increase in stem height.

**Keywords:** Electromagnetic, Electric Field, DC High Voltage, Choy Sam, Bean Sprout

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### 1. Introduction

One of the sources of the electric fields and magnetic fields is the transmission line. In the last few decades, many researches have been performed to observe the effect of electric fields towards the human body and animals. This would probably improve the exposure of the electrical fields, magnetic fields and electromagnetic fields (EMF) for high voltage applications. Conversely, its effect on a human is not just impairments but it also can give more benefits in several approaches if it is well controlled. Since three decades ago, EMF such a various frequency ranges have been used in physiotherapy for the treatment of several diseases.

The recent experimental results of the previous studies indicated that the bean sprout exposed to the vertical electric field direction has a better growth compared to the horizontal part of the electric field direction [1, 2]. The investigation was carried out to determine whether by placing the soybean seeds in electric field for a certain period of time would affect their germination rate. If it happens, the period between planting and emergence can be reduced [3]. The initial appearance usually means healthier plants and energy producing higher yields [4]. Therefore, the use of electrical energy to biological organisms has the potential to increase the production of food. This can lead to the uses of electricity to stimulate the growth of the fair organism or use it to slow down the growth or reproduction of unwanted organisms. If either of these approaches yields positive results, humans would benefit [4]. The effect of electric field treated water towards young vegetables which were a new kind of method has been carried out to give more significant results.

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