

Weak Electric Fields Enhance Growth and Nutritional Quality of Kale

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Abstract : Generally, plants growing on the earth are under the influence of natural electric fields and may even require exposure of the electric field to survive. Electric signals have been observed within plants and seem to play an important role on various metabolic processes, but their role is not fully understood. In this study, we attempted to explore the response of plants under external electric fields in kale (*Brassica oleracea* var. *acephala*). The plants were hydroponically grown for 28 days in a plant factory. Electric currents at 10, 50 and 100 mA were supplied to nutrient solution for 3 weeks. Additionally, some of the plants were cultivated in a Faraday cage to remove the natural electric field. Kale plants exposed to electric fields had higher fresh weight than the control and plants in Faraday cage. Absence of electric field caused a significant decrease in shoot dry weight and root growth. Leaf area also showed a similar response with shoot fresh weight. Supplying weak electric stimulation enhanced nutritional quality including total phenolic content and antioxidant capacity. This work provides basic information on the effects of electric fields on plants and is a meaningful attempt for developing a new economical technology to increase crop productivity and quality by applying an electric field. This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry and Fisheries (IPET) through Agriculture, Food and Rural Affairs Research Center Support Program, funded by Ministry of Agriculture, Food and Rural Affairs (MAFRA) (717001-07-02-HD240).

Keywords : electroculture, electric signal, faraday cage, electric field

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