

**Title** Evaluation of high electric field chamber for shelf life extension of food and agricultural commodities

**Author** T. Shiina, D. Nei, N. Nakamura and M. Thammawong

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### **Abstract**

An alternative current (AC) high electric field chamber (HEF chamber, a newly developed refrigerator device) was used to investigate the physical characteristics expected to play a role in the storage shelf life of food and agricultural commodities. The HEF chamber with low temperature design was set at different input voltages (0-7 kV) and temperature levels (1-25°C). At each condition of voltage input and temperature setting, changes of ozone emission (O<sub>3</sub> emission) and temperature in the chamber were continuously monitored for 24 h. Mean value of O<sub>3</sub> emission produced within the HEF chamber was highest at 1°C with 100% HEF voltage (7 kV). A decreasing O<sub>3</sub> concentration was observed with lower voltage input (75, 50, and 25%, respectively) and higher temperatures (5, 10, 15, 20, and 25°C, respectively). Since electric fields have been reported to extend shelf life of fresh commodities, emission of O<sub>3</sub> in the HEF chamber observed in this study seems to be a key factor contributing to effectiveness of the combined HEF and low temperature effect on enhanced storage life and quality of fresh commodities. A comparison between the HEF and non-HEF/O<sub>3</sub> treatment, based on changes of physiological and chemical composition and microorganism growth, was conducted to clarify the effects of O<sub>3</sub> emission on quality of fresh produce. Further development of the HEF chamber may lead to development of a novel refrigerator device for storage of fresh food and agricultural commodities.