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Decomposition of 2,4-dichlorobenzonic acid in hydroponic nutrient solution using discharge inside bubble

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Decomposition of 2,4-dichlorobenzonic acid (DCBA) in hydroponic nutrient solution using discharge inside bubble is investigated. Air gas is injected into water through a vertically positioned glass tube, into which high voltage wire electrode is placed to generate plasmas at low applied voltage. A magnetic pulse compression circuit is used to generate high voltage pulses. The concentration of DCBA and chloride ion is determined using a high performance liquid chromatography and an ion chromatography, respectively. The concentration of DCBA decreases and the concentration of chloride ion increases with increasing discharge treatment time. The chloro groups in the DCBA are preferentially detached from the DCBA by the oxidation reactions of the chemical species generated by the discharges. Since the nitric acid is generated by the discharge treatment, the pH decreases with increasing discharge treatment. The water treated by the discharge treatment is used as the nutrient solution for cultivating cucumber plants in a hydroponic system. The pH of the water after the discharge treatment is adjusted to 5.7 using a pH adjuster, and is supplied to the plants. The plant height is evaluated as the growth rate of the plants. The results show that the growth of almost plants is inhibited by the DCBA without discharge treatment; in contrast, the plants with discharge treatment grow healthily.

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