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Inactivation of *Ralstonia solanacearum* Using Pulse Discharge under Culture Solution in Hydroponics

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A discharge plasma under water is a promising candidate to reduce the risks of bacterial infection in a hydroponics culture system. In addition, the discharge plasma provides nitric acid into the solution, which promote plant growth rate. We developed a system using plasma under solution and the performance of the developed system was evaluated using tomato seedlings in the recirculation system and *Ralstonia solanacearum* which causes wilt disease, followed by a serious crop loss. The discharge reactor consisted of a wire high-voltage electrode in the cylinder and a grounded electrode on cylinder outside. The reactor was sunk under the culture solution. Atmospheric air gas was injected into the cylinder and released through holes. Holes of the cylinder were 0.5 mm in a diameter and 2.0 mm separation one another. Repetitive nanosecond pulses are applied to the wire electrode, using a magnetic pulse compression (MPC) pulsed power generator. The applied voltage was 10 kV with 150 ns pulse width and 2,000 pps repetition rate. The 15 L culture solution was heavily contaminated with *R.solanacearum*. After that, the discharge plasma treatment was continued for 100 min. We prepared another experimental section that was a control. The culture solution in control was contaminated with *R.solanacearum* without plasma treatment. Seedlings were monitored and disease severity was evaluated. The result shows that the disease severity of discharge group increased on the 6th day, and was 20 % on the 8th day and after. In contrast, the disease severity of control increased on the 4th day and continuously increasing to be 100 % on the 8th day. The density of *R. solanacearum* of control was above 10^7 CFU/mL, in contrast, that of discharge group was below 10^2 CFU/mL on the initial day.

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