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Plasma and pulsed power application to agriculture

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Plasma and pulsed power technologies were utilized for agriculture, fishery and food processing applications. Repetitively operated compact pulsed power generators with a moderate peak power were developed for the applications in several stages of agriculture and fishery. Types of pulsed power that have biological effects are caused with gas discharges, water discharges, and intense high-electric fields. The pulsed repetitive discharge were used for promoting growth of the vegetables and fruits such as Brassica rapa var. perviridis, Fragaria × ananassa, Spainacia oleracea and Raphanus sativus var. sativus. The growth rate and sugar content in the strawberry harvested after the cultivation increased by the plasma irradiation to the hydroponic solution. The yielding rate of mushroom (Lentinula edodes) was also improved with the high-voltage stimulation in fruit-body formation phase. When the high-voltage was applied to the cultivated bed of the mushroom, the surface potential of the bed changes from zero to the high-voltage. This potential change causes high electric field in the bed. The hypha of the L. edodes were accelerated owing to the strong electrical field. The high-voltage and the non-thermal plasma contributed to improve for keeping freshness for a relatively longer period of perishables such as fish and shellfish. These applications can contribute a food supply chain in the world.