

高電圧パルスによる原木しいたけ栽培の増収および早期発見効果の影響 Influence of pulsed electric field on amount of production and harvest period of log wood *L.edodes*

吉田太郎¹⁾, 宮本海¹⁾, 高橋克幸^{1,2)}, 高木浩一^{1,2)}, 高橋久祐³⁾
YOSHIDA Taro¹⁾, MIYAMOTO Kai¹⁾, TAKHASHI Katsuyuki^{1,2)}, TAKAKI Koichi^{1,2)},
TAKAHASHI Kyusuke³⁾

岩手大学¹⁾, 岩手大学次世代アグリイノベーションセンター²⁾, 盛岡森林組合³⁾,
Iwate University¹⁾, Agri-Innovation Center, Iwate University²⁾,
Morioka Forest Union³⁾

Introduction

The application of pulsed electric field (PEF) to improve the yield in edible mushroom cultivation has already been attempted by some research groups [1]. In the present experiment, two types of power sources were used to generate high voltage pulse to clarify the influence of electric parameters on the promotion of mushroom production. High voltage pulses were applied on wood log inoculated by Shiitake (*Lentinus edodes*) mushroom and effect on sporocarp yield was measured. Two types of pulsed generator, Cockcroft-Walton circuit (CWC) and Marx generator, are used to evaluate influence of the total input energy and pulse width on the production.

Experimental setup

Figure 1 shows a schematic of the experiment. A wood log was setup on an acrylic insulating plate, and electrode plates were placed at both extremity of the log. The total input energy into the logs was controlled by amplitude and number of the apply voltage. In the case of Marx generator with the equivalent total capacitance of 55 nF, the high voltage pulses with maximum voltage of 30 kV and 50 kV were applied to the cultivation log 5 times, and the total input energy were 120 J and 350 J, respectively. In the case of the pulsed power generator (Green techno, GM100) based on (CWC) with the equivalent total capacitance of 130 pF, high voltage pulses with maximum voltage of 30 kV and 50 kV were applied 500 times, and the total input energy were 60 J and 150 J, respectively.

Results

Figure 2 shows the average weight of sporocarp cropped per logs, for 4 seasons. PEF was applied after the 1st flush which was used to form 5 homogenous groups. The weight of harvested sporocarps is increased by applying voltages pulses.

For the CWC generator, when energy applied increase, yield increase as well. Considering the yield from the second flush, the weight of sporocarp harvesting of log treated by the Marx generator increased up to 1.5 times than the control group.

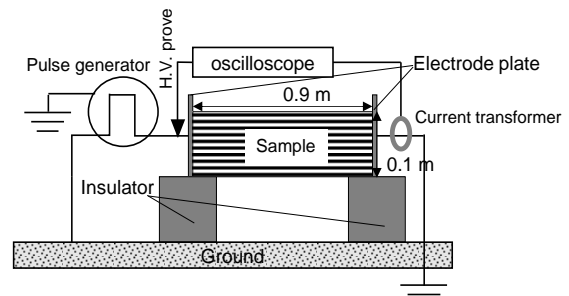


Fig. 1 Experimental setup for pulsed voltage stimulation to the *L. edodes* logs.

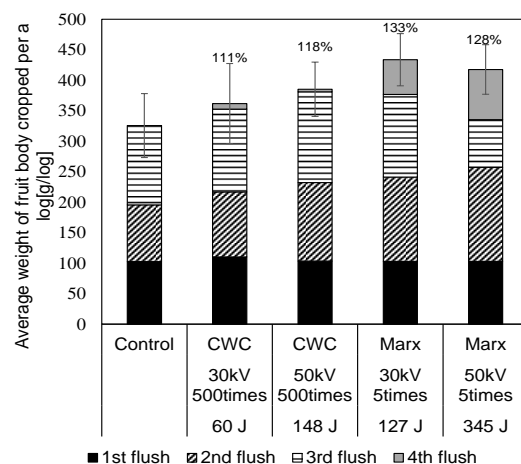


Fig. 2 Average yield of *L. edodes* sporocarps per log for 4 flushes.

References

- 1) Tsukamoto, S., Maeda, T., Ikeda, M., & Akiyama, H. Digest of Technical Papers-IEEE International Pulsed Power Conference, 1116–1119. (2003).