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高電圧パルスパワーを用いた電気刺激による菌床シイタケの増収効果の検討

Effects of electrical stimulation by high voltage pulse on yield in sawdust-bed cultivation *Lentinula edodes*

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Effects of electrical stimulation on sawdust-bed in Shiitake mushroom (*Lentinula edodes*) cultivation using high voltage pulse and on laccase activity of *Lentinula edodes* were investigated experimentally. In the experiment, *Lentinula edodes* was stimulated by applying pulse voltage on the mushroom hypha at various amplitudes and numbers of applying pulse voltage.

The pulse high-voltage was produced by high-voltage generator (*Raizo*; GM100), which was developed by Green-Techno Corp. as shown in **Fig. 1**. The high-voltage generator *Raizo* mainly consisted of a Cockcroft-Walton circuit, a coaxial-cable, and a sphere electrode for applying high-voltage to the sawdust-bed. The maximum output voltage of the generator *Raizo* was 100 kV with several microseconds in pulse width. The voltage applied to the sawdust-bed was changed to obtain the optimum input energy for the stimulation. The applied voltage was controlled by gap length of the closing gap switch which was connected in series to the coaxial-cable. The energy was stored in the coaxial-cable as electrostatic energy. The stored energy was transmitted to the sawdust-bed through the closing gap switch.

Figure 2 shows the number of harvested fruit body of *Lentinula edodes* at various input energies to the sawdust-bed. The number of fruit body increased gradually with increasing input energy. The number of fruit body increased to be 2.5 times larger by applying pulse voltage as electrical stimulation at 13.6 J (1200 times applying voltage) input energy. From the enzyme analysis, it was confirmed that a laccase (Lcc1) was activated by applying pulse voltage. Lcc1 is strongly related to the fruit body formation. Therefore, the experimental result of the enzyme Lcc1 indicates that the pulse voltage stimulation works as stimulation for the fruit body formation through activation of Lcc1.

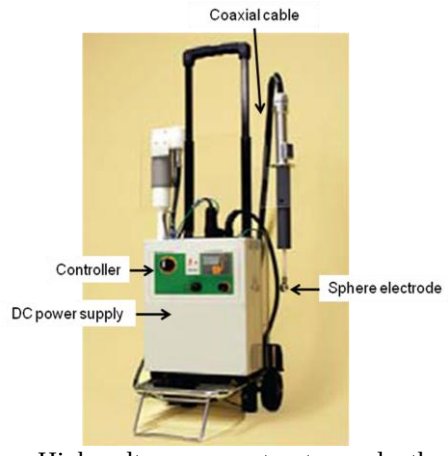

Fig. 1. High-voltage generator to apply the pulse stimulation on the mushroom bed developed by Green-Techno Corp.

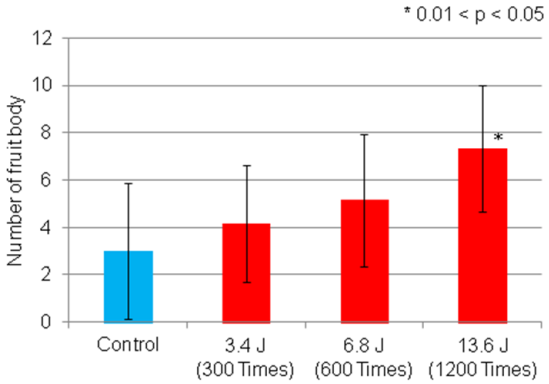

Fig. 2. Number of *Lentinula edodes* fruit body for various stimulation condition by *Raizo*.

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