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Ambient Temperature Effects on Evaluation of Plant Physiological Activity Using Plant Bioelectric Potential

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The plant factory has been in practical use for ensuring a stable food supply and cultivating high-quality food. However, it has problems with capital and operating expenditures, because it is necessary to prepare a big room of the same level of cleanliness as that of a semiconductor factory and to use a full environment control system that includes an air conditioner, a feed nutrient solution line, and sensing devices in continuous operation. Therefore, we focused on the bioelectric potential response as a promising and low-cost approach of evaluating plant physiological activities. Bioelectric potential is generated by ions in a plant cell and the potential is related to plant physiological activities. Although we already reported that the potential response differs depending on the on-off cycle of illumination and is related to photosynthetic activity, there is no report on the effects of ambient temperature and light interruption time on the measurement of bioelectric potential. In this study, we investigated the effects of ambient temperature and light interruption time on the evaluation of plant physiological activities. In the experiments, we measured bioelectric potential responses and CO_2 concentration when light irradiation was started or stopped at several temperatures. In addition, we investigated the effect of the light interruption time on the evaluation of plant physiological activities using plant bioelectric potential. These results contribute to the improvement of the precision of the evaluation system for plant physiological activities using bioelectric potential responses.

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