「STUDY ON LIGHT AND ROOT ZONE ENVIRONMENTS FOR GROWTH AND CAMPTOTHECIN ACCUMULATION OF *OPHIORRHIZA PUMILA*」の要約データ

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Ophiorrhiza pumila, a wild medicinal plant, is distributed on the floors of humid inland forests in subtropical areas and accumulates camptothecin (CPT), which is used clinically as an anti-tumor agent. To meet the increasing demand for CPT and facilitate its stable production, it is necessary to clarify the characteristics of gas exchange rates of whole plants and establish the suitable light and root-zone environments for *O. pumila* cultivation in a plant factory with artificial lighting (PFAL). At first, the concentration distribution of CPT was investigated in each organ and at each growth stage (Chapter 2). To produce the maximum CPT content from *O. pumila*, stem and root were the essential organs, and the seed-ripening stage was the best timing for harvest. To determine the suitable light conditions for growth, the photosynthetic rate (P_n) and transpiration rate (E) of whole plants were measured using an open-type assimilation chamber (Chapter 3). These analyses revealed that the light saturation point was at a photosynthetic photon flux density (PPFD) of 300 μmol m^{-2} s^{-1}, and the E tended to decrease with increasing PPFD above 100 μmol m^{-2} s^{-1}. As a result, we found that 100 μmol m^{-2} s^{-1} PPFD and 28°C were good conditions of PPFD and air temperature for photosynthesis and transpiration. Also, when compared these results to the P_n and E of lettuce, and *O. pumila* exhibited to be a typical shade plant. To investigate the suitable root-zone conditions, the effects of nutrient solution concentration (NSC; 0.125, 0.25, 0.5, and 1.0 times) and temperature (NST; 10, 20, 26, and 36°C) were examined respectively (Chapter 4). According to these results, the 0.25 times and 20°C was the suitable NSC and NST, respectively, for growth and CPT accumulation. My research revealed that the suitable environmental conditions for the growth and CPT accumulation from *O. pumila* cultivated in a PFAL, and it may contribute the efficient CPT production for a clinical anti-tumor agent.