

Effect of Light Receiving rate on Growth and Quality of Ginseng Cultivated in Plastic House

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Ginseng is a shade-plant cultivated using shading facilities. However, at too low light levels, root growth is poor, and at high light levels, the destruction of chlorophyll reduces the photosynthesis efficiency due to leaf burn and early fall leaves. The ginseng has a lightsaturation point of 12,000 ~ 15,000 lux when grown at 15 to 20°C and 9,500 lux at 25°C. This study was conducted to select the optimal light intensity of 3-year-old ginseng grown in blue-white film plastic house. The seeds were planted in the blue-white film plastic house with different light receiving rate (March 17, 2020). Between April and September, the average air temperature in the house was 20.4-20.7°C. Average soil temperature was 18.3°C-18.5°C. The chemical properties of the test soil was as follows. The pH level was 7.0-7.4, EC was 0.5-0.6 dS/m, OM was at the levels of 33.6-37.7 g/kg, P₂O₅ was 513.0-590.8 mg/kg, slightly higher than the allowable 400 mg/kg. The amount of light intensity, illuminance, and solar radiation in the blue-white film house was increased as the light-receiving rate increased and the amount of light intensity was found to be 9-14% compared to the open field, 8-13% illuminance and 9-14% solar irradiation respectively. The photosynthesis rate was the lowest at 3.1 μmolCO₂/m²/s in the 9% light blue-white plastic house and 4.2 and 4.0 μmolCO₂/m²/s in the 12% and 14% light blue-white plastic house, respectively. These results generally indicate that the photosynthesis of plants increases with the amount of light, but the ginseng has a lower light saturation point at high temperatures, and the higher the amount of light, the lower the photosynthetic efficiency. The SPAD (chlorophyll content) value decreased as the increase of light-receiving rate, and was the highest at 32.7 in 9% light blue-white plastic house. Ginseng germination started on April 11 and took 13-15 days to germinate. The overall germination rate was 82.9-85.8%. The plant height and length of stem were long in the 9% light-receiving plastic house. The diameter of stem was thick in the 12-14% light-receiving plastic house. In the 12% and 14% light-receiving plastic house, the length and diameter of taproot was long and thick, so the fresh weight of root per plant was 20 g or more, which was heavier than 16.9 g of the 9% light-receiving plastic house. The disease incidence (Alternaria blight, Gray mold and Damping-off etc.) rate were 0.9-2.7%. The incidence of Sclerotinia rot disease was 7.5-8.4%, and root rot was 0-20.0%. The incidence ratio of rusty root ginseng was 34.4-38.7% level, which was an increase from the previous year's 15% level.

Key words: Ginseng, Light-receiving rate, Plastic house, Blue-white film

[본 연구는 인삼의 최적 생육환경 조성을 위한 ICT 융복합 첨단재배관리 시스템 개발 사업(사업번호:317018-05-4-HD020)의 지원에 의해 이루어진 결과로 이에 감사드립니다.]

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