A Comparative Study of Ginseng Berry Production in a Vertical Farm and an Open Field

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Ginsenosides are a class of natural product steroid glycosides and triterpenes with great therapeutic value. Although ginseng berries contain 4–10 times more ginsenosides than ginseng roots, a sustainable method has been established for ginseng root production but not for ginseng berry production. We elucidated the best conditions for stable berry production by cultivating four-year-old ginsengs on a developed vertical farm (VF) platform in a 3-level stereoscopic facility. Ginseng was cultivated in soil in mesh containers in three levels of cultivation shelves (W 0.85 m × D 4.80 m × H 1.15 m) installed in a cultivation room (W 5.88 m × D 10.00 m × H 6.00 m). Each plant produced approximately 15 berries (3 g) in the VF, which is as many as those produced by plants in open fields (OF). Ginsenoside Rg1 and syringaresinol levels were higher in the berries from the VF than in those from the OF. In contrast, levels of total ginsenosides Re, Rb2, and Rd were lower in berries from the VF than in those from the OF. Further, the levels of ginsenoside Re (major ginsenoside in ginseng berries from VF) were similar in the VF and OF. This difference in chemical composition can be attributed to the less variable environmental conditions in the VF compared to the OF. Berry yield strongly correlated with stem diameter and root weight. We thus conclude that this VF platform could be used to produce as many ginseng berries as an OF would produce. Additionally, it could be used for year-round production, thus enabling constant supply of therapeutically useful ginseng berries.

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