

Research Insight

Open Access

Comparative Analysis of Wild-Simulated and Facility Cultivation Modes of *Dendrobium officinale*

Xinchao Cao ✉

Caonong Herbal Health Food Business Department, Lin'an District, Hangzhou, 311300, Zhejiang, China

✉ Corresponding email: 994954377@qq.comMedicinal Plant Research, 2026, Vol.16, No.4 doi: [10.5376/mpr.2026.16.0018](https://doi.org/10.5376/mpr.2026.16.0018)

Received: 30 May, 2026

Accepted: 12 Jul., 2026

Published: 29 Jul., 2026

Copyright © 2026 Cao, This is an open access article published under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Preferred citation for this article:

Cao X.C., 2026, Comparative analysis of wild-simulated and facility cultivation modes of *Dendrobium officinale*, Medicinal Plant Research, 16(4): 283-295 (doi: [10.5376/mpr.2026.16.0018](https://doi.org/10.5376/mpr.2026.16.0018))

Abstract This article analyzes and compared the differences between the two cultivation modes in terms of ecological environment regulation, production management, growth performance, yield formation, active compound accumulation, and industrial applications. The results showed that wild-simulated cultivation promotes secondary metabolite accumulation through the reconstruction of natural epiphytic environments, ecological adaptation, microbial interactions, and moderate environmental stress, demonstrating advantages in plant morphology, metabolite richness, and overall medicinal quality. In contrast, facility cultivation relies on greenhouse environmental control, standardized seedlings, and precise water-fertilizer management to improve production stability, yield performance, and large-scale supply capacity. The two cultivation modes exhibit distinct characteristics in yield formation and quality development: facility cultivation is more suitable for large-scale and standardized production, whereas wild-simulated cultivation is more appropriate for the development of high-quality medicinal materials and ecological products. Future development of the *Dendrobium officinale* industry should promote the integration of advantages from both cultivation modes by establishing a combined production system of “facility-based seedling propagation-ecological cultivation-quality improvement,” strengthening precision environmental regulation, green cultivation technologies, and intelligent management, and developing a comprehensive quality evaluation system incorporating polysaccharides, flavonoids, alkaloids, metabolomic characteristics, and bioactivity-related indicators. These efforts promote the development of the *Dendrobium officinale* industry toward high quality, high efficiency, and sustainability.

Keywords *Dendrobium officinale*; wild-simulated cultivation; facility cultivation; active compounds; quality evaluation

1 Introduction

Dendrobium officinale is a precious perennial orchid medicinal plant that has long been used in China as both a traditional medicine and a functional food. It is recorded in early materia medica and is officially included in the Chinese Pharmacopoeia, and its dried stems are widely consumed directly or processed into “Tiepi Fengdou” products (Yuan et al., 2020; Xu et al., 2022). Modern phytochemical studies show that *D. officinale* contains abundant polysaccharides, alkaloids, flavonoids, phenolic acids, amino acids, bibenzyls, phenanthrenes, and other constituents, among which polysaccharides are generally regarded as the principal active components and an important quality indicator (Tan et al., 2023; Lai et al., 2024). These compounds underpin a broad range of reported bioactivities, including immunomodulatory, antioxidant, anti-inflammatory, hypoglycemic, gastrointestinal protective, hepatoprotective, cardiovascular protective, anti-osteoporosis, and neuroprotective effects, giving *D. officinale* substantial medicinal, nutritional, and commercial value (Chen et al., 2021; Duan et al., 2022). In recent years, this species has attracted increasing attention from the medicine, health food, and cosmetics sectors, and its stems, leaves, and flowers are all being explored for diversified product development and higher-value utilization (Li et al., 2025; Wang et al., 2025).

Despite its high resource value, the industrial development of *D. officinale* has long been constrained by the scarcity of wild resources, low natural reproduction rate, slow growth, and historically heavy dependence on natural habitats. Wild populations are limited, and increasing market demand has intensified the contradiction between resource protection and industrial supply (Cheng et al., 2026). To address this problem, artificial rapid propagation based on tissue culture has been widely adopted and has become an essential foundation of the