

Meta Analysis

Open Access

Analysis of Wild Resource Decline and Artificial Germplasm Restoration Pathways of *Paris* spp.

Chuchu Liu ✉

Institute of Life Science, Jiyang College of Zhejiang AandF University, Zhuji, 311800, Zhejiang, China

✉ Corresponding email: chuchu.liu@jicaf.orgMedicinal Plant Research, 2026, Vol.16, No.4 doi: [10.5376/mpr.2026.16.0020](https://doi.org/10.5376/mpr.2026.16.0020)

Received: 20 Jun., 2026

Accepted: 08 Aug., 2026

Published: 23 Aug., 2026

Copyright © 2026 Liu, 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:

Liu C.C., 2026, Analysis of wild resource decline and artificial germplasm restoration pathways of *Paris* spp., Medicinal Plant Research, 16(4): 313-326 (doi: [10.5376/mpr.2026.16.0020](https://doi.org/10.5376/mpr.2026.16.0020))

Abstract *Paris* spp. are important medicinal plant resources in China, and their rhizomes are rich in bioactive compounds, particularly steroidal saponins, which possess high medicinal value and considerable potential for industrial utilization. However, long-term dependence on wild harvesting, habitat degradation, and limited natural regeneration capacity have resulted in continuous declines of wild *Paris* resources, increasing the risk of losing valuable germplasm and making it difficult to meet the sustainable development needs of the traditional Chinese medicine industry. This study investigates the causes of wild resource decline and the pathways for artificial germplasm restoration of *Paris* spp. This article analyzes population dynamics, and impacts of excessive harvesting and ecological changes on resource stability. Furthermore, the major constraints in artificial germplasm development are summarized, including high dependence on wild germplasm sources, long propagation cycles, insufficient rapid propagation systems, and incomplete genetic background and quality evaluation frameworks. To address these challenges, this study proposes a restoration strategy based on wild germplasm conservation and elite germplasm selection, supported by efficient propagation technologies, understory ecological cultivation, and standardized production systems. The potential applications of molecular markers, genomics-assisted breeding, and long-term resource management strategies in *Paris* germplasm innovation are also discussed. Future efforts should focus on wild resource conservation, core germplasm construction, precise evaluation of elite materials, and ecological adaptation-based cultivation to promote the transition of *Paris* resource utilization from wild collection-dependent exploitation toward artificial germplasm-driven and ecologically sustainable production systems. This review proposes theoretical references for genetic resource conservation, stable medicinal material supply, and sustainable industrial development of *Paris* spp.

Keywords *Paris* spp.; Wild resource decline; Artificial germplasm; Germplasm conservation; Propagation

1 Introduction

Paris spp. are a group of medicinally important perennial herbs with long-standing use in Asian traditional medicine and substantial contemporary value for the pharmaceutical industry. The genus has been used in China for more than 2 000 years, and several *Paris* taxa, especially *P. polyphylla*, *P. polyphylla* var. *yunnanensis*, and *P. polyphylla* var. *chinensis*, are widely employed in ethnomedicine and formal medicinal systems for treating trauma, bleeding, inflammation, swelling, skin disorders, and related conditions (Jiang et al., 2022; Ye et al., 2025). Modern phytochemical and pharmacological studies show that *Paris* species are rich in bioactive secondary metabolites, especially steroidal saponins, which account for more than 80% of identified active compounds and are regarded as the principal medicinal constituents and chemotaxonomic markers of the genus (Ding et al., 2021; Rawat et al., 2023; Zhang et al., 2025). Since 1960, more than 320-330 compounds have been isolated from *Paris* plants, including steroidal saponins, flavonoids, phytosterols, triterpenes, polysaccharides, and related constituents, reflecting both chemical richness and broad development potential (Thapa et al., 2022). Representative steroidal saponins such as polyphyllins and *Paris* saponins exhibit anticancer, hemostatic, anti-inflammatory, antimicrobial, antiviral, immunomodulatory, and other activities, and recent compound-level studies continue to identify new molecules with notable cytotoxic or anti-inflammatory effects (Thakur et al., 2023). This medicinal importance has driven intense utilization of rhizomes as the source material for traditional remedies and for more than 100 proprietary Chinese medicines, making *Paris* spp. both biologically valuable and economically strategic (Kunwar et al., 2020).