



Impact of Moss Species on Orchid Conservation in the Dry Climates of the Western Ghats in Wayanad

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Abstract

This study investigates the role of specific moss species in supporting orchid conservation under dry climate conditions in the Western Ghats, with a particular focus on Wayanad. Conducted over a three-year period, the research centered on five key moss species—*Sphagnum squarrosum*, *Hypnum plumosum*, *Polytrichum commune*, *Rhodobryum ontariense*, and *Octoblepharum albidum*—and their capacity to foster orchid establishment and sustainability. These mosses contribute essential ecological functions that benefit native orchids, particularly in challenging, arid environments. Our observations demonstrated that *Sphagnum squarrosum* and *Hypnum plumosum* have superior moisture retention abilities, maintaining a stable, humid microclimate around orchid roots, which is crucial during seasonal dry spells. This humidity facilitates orchid seed germination, improves root development, and mitigates desiccation stress for orchid species adapted to Wayanad, such as *Dendrobium* and *Vanda*. Additionally, *Polytrichum commune* and *Rhodobryum ontariense* contribute to soil nutrient enrichment. The gradual breakdown of these mosses releases nutrients essential for orchids, enhancing growth and vigor, particularly in nutrient-limited substrates common in dry forest areas. Moreover, these mosses serve as a protective barrier, shielding orchids from harsh temperature fluctuations and physical damage due to their dense, cushion-like structure. This protection supports orchids by reducing environmental stresses that can impair growth and reproduction. Over the three years of study, orchids cultivated in close association with these mosses exhibited enhanced survival rates, healthier root systems, and more robust flowering and seeding compared to orchids grown in non-moss environments. This research underscores the importance of mosses as ecological allies for orchids in dry climates, offering multiple benefits that extend to overall biodiversity. As climate variability increases, the resilience provided by these moss-microhabitats becomes even more critical. Our findings advocate for integrated conservation strategies that protect both mosses and orchids, emphasizing the need for habitat management that acknowledges their interdependent roles. By conserving these moss-rich microhabitats, we can foster the growth and persistence of native orchids, thereby supporting the biodiversity and ecological stability of the Western Ghats' fragile ecosystems.

Keywords: Orchid Conservation; Moss-Orchid Interaction; Dry Climate Adaptation; Western Ghats Biodiversity; *Sphagnum Squarrosum*; *Hypnum Plumosum*; *Polytrichum Commune*; *Rhodobryum Ontariense*; *Octoblepharum Albidum*; Microhabitat and Moisture Retention