

Pathological Evaluation of Common Leaf Spot Diseases in Indigenous Medicinal Flora

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Abstract: Leaf spot diseases represent one of the most economically and ecologically damaging categories of plant pathology affecting indigenous medicinal flora worldwide. These diseases, caused by a range of fungal, bacterial, and oomycete pathogens, reduce photosynthetic capacity, compromise active compound yields, and threaten the conservation of ethnobotanically significant plant species. This paper presents a systematic pathological evaluation of common leaf spot diseases affecting ten indigenous medicinal plant species collected from forest margins and cultivated herb gardens across a temperate Himalayan zone. Morphological, cultural, and molecular characterization techniques including ITS-rDNA sequencing were used to identify causal organisms. Disease severity was assessed using standard rating scales, and the relationship between infection intensity and foliar biochemical parameters was measured. Results identified seven distinct pathogen species as primary causal agents, with *Alternaria alternata* and *Cercospora* spp. being the most prevalent across host species. Significant negative correlations were found between lesion area index and chlorophyll content, total phenolic content, and essential oil yield. Severely infected plants showed up to 38% reduction in secondary metabolite concentration compared to healthy controls. Histopathological examination revealed that pathogen penetration patterns differed markedly between host species, influencing both disease progression rate and plant defense activation. Findings contribute a structured pathological profile of leaf spot incidence in underexplored indigenous flora and offer baseline data for future disease management and conservation programs targeting high-value medicinal species.

Keywords: Leaf spot disease, indigenous medicinal plants, *Alternaria alternata*, *Cercospora*, ITS-rDNA, secondary metabolites, disease severity