

Research Article

Contribution of Oil Palm Plantations to Fern Species Distribution and Diversity in West Godavari District, Andhra Pradesh, India.

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Abstract

Ferns and fern allies are classified as seedless vascular plants under the division Pteridophyta in the plant kingdom. The uplands of West Godavari District in the state of Andhra Pradesh have historically lacked fern species, as the land has been predominantly used as cropland for the past century. Oil palm plantations in this region have contributed significantly to the distribution and existence of various fern species. Field studies revealed the presence of several fern species that were previously absent in this area.

Keywords: Fern, Oil palm plantations, new habitat, *Pleopeltis polypodioides*, *Cyclopeltis semicordata*, and *Thelypteris papillo*

Introduction

Ferns and fern allies are classified as seedless vascular plants within the plant kingdom Pteridophyta. These groups of plants are cryptogamic, meaning they do not produce flowers, seeds, or fruits, which distinguishes them from higher plants. They are similar to bryophytes and algae in their spore-based reproduction but differ by having vascular tissues (Yusuf, 2010). Most ferns are typically found at lower altitudes in tropical forests, although they can also colonize the under

stories of some temperate forests (Rost, Barbour, Stocking, & Murphy, 2006). Approximately 13,600 species of pteridophytes are reported worldwide, with about 1,267 species recorded in India (Sunjeet kumar, 2024). According to the studies conducted by Alka Kumari et al. (2018), fern species richness is influenced by various factors, including annual temperature, annual rainfall, number of rainy days, potential evapo-transpiration, actual evapo-transpiration, moisture index, soil pH, and soil moisture. A total of 184 species, belonging to 75 genera

and 40 families, were recorded in the Eastern Ghats. Among these, 91 fern species were identified in the Andhra Pradesh region (Mandal *et al.*, 2020). The distribution and detailed study of pteridophytes in the Punyagiri Hills near Vizianagaram, located in the Eastern Ghats, were thoroughly investigated. (Murty *et al.*, 2011). Fifteen species of pteridophytes reported from the Nallamala forests by Tulasi Rao *et al.* (2007) also highlighted the ornamental and medicinal uses of ferns such as *Marsilea*, *Aspidium*, *Tectaria*, *Lycopodium*, *Osmunda*, *Davalia*, *Adiantum*, *Athyrium*, and *Blechnum*.

Ecologically, ferns are most commonly found in the shaded, damp forests of temperate and tropical zones. While some fern species thrive equally well on soil and rocks, others are strictly restricted to rocky habitats, where they grow in fissures and crevices of cliffs, boulders, and taluses. The type of substrate also influences fern distribution: acidic rocks like granites, sandstones, and quartzites support distinct fern species, which differ from those associated with alkaline rocks such as calcites and dolomites. Additionally, a few fern species are uniquely adapted to serpentine and related rocks. This adaptability plays a crucial role in the distribution of ferns. This research article aims to examine their distribution in the upland areas of West Godavari District, Andhra Pradesh, where fern species have recently been observed growing on oil palm trunks.

Study Area and Findings

West Godavari district is situated in the western delta of the

Godavari River, spanning latitudes 16°15'N to 17°30'N and longitudes 80°50'E to 81°55'E. Covering an area of approximately 8,506 km², the district is divided into three distinct geographical regions: the Delta, Upland, and Agency.

Upland area consists of alluvial soil and this area receives an average annual rainfall of 1,143 mm, with approximately 70% occurring during the southwest monsoon (June to September) and 30% during the northeast monsoon (October to December). Major floods are typically observed during the active phase of the southwest monsoon, particularly in the second and third weeks of August.



Fig.1: Fern surrounded the trunk of Oil Palm tree.

In early 1990's oil palm cultivation had started in upland region. The recent survey reported that Oil Palm was cultivated has been increased about 1,16,073 hectares in West Godavari district. As per the observations by local people and the literature, no fern plant was observed in this upland. Oil palm trees make a

cooler environment and their stem facilitate favourable conditions for the existence of fern species including winter and summer seasons (Fig.1). As per the survey, the trees crossed 15 years age consists the fern plants. About 25% of the plants supporting the fern. Fern species *Pleopeltis polypodioides*, *Cyclopeltis semicordata*, and *Thelypteris papillo* are identified (Fig.2).

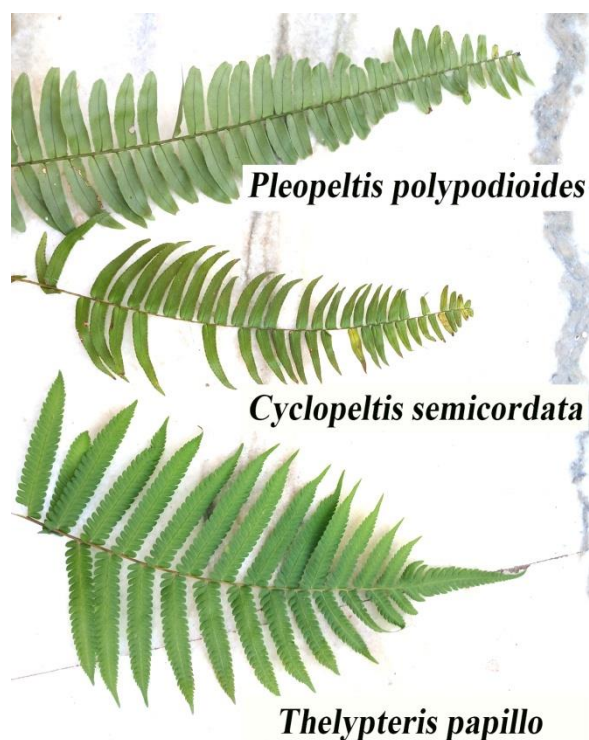


Fig.2: Identified three fern species in upland area of West Godavari district

Discussion

Nephrolepis cordifolia, *Pteris pellucida*, *Pteris vittata*, and *Pleopeltis pallida* were documented on Punyagiri Hills in Visakhapatnam, Andhra Pradesh, at an altitude of 230 meters above mean sea level (MSL) (Murty et al. 2011). The study by Mandal et al. (2011) highlights that the Eastern Ghats are rich in pteridophyte diversity. However, challenges such as shifting cultivation, forest fires,

grazing, biological invasions, and other anthropogenic pressures pose significant threats to the survival of ferns and their allies.

Several fern species adapted to specific climatic niches may encounter new challenges due to the adverse effects of climate change (Anderson, 2018). Over 130 years of observational studies, two fern species *Trichomanes bipunctatum* and *Trichomanes minutum* were reported in the Andaman and Nicobar Islands (Singh et al. 2016). In India, various types of ferns and fern allies are found in the Himalayan mountain range, as well as in the Eastern and Western Ghats (Rahul kumar, 2024).

Some ferns and fern allies identified in the Papikondalu Hills of the Eastern Ghats are distributed across three districts of the erstwhile united Andhra Pradesh state: East Godavari, West Godavari, and Khammam. (Amrutha Lakshmi and Balaji 2017).

The natural populations of *G. gigantea* are under threat not only from deforestation and habitat modifications but also due to their limited adaptability to the micro-environment of shaded and moist habitats. Additionally, landscape features and habitat requirements, including specific environmental factors, play a significant role in influencing the distribution and abundance of *G. gigantea* (Banik et al. 2023).

Considering to this, occurrence of fern in upland of West Godavari district represents an opportunistic distribution of fern species into new

regions where they were previously absent.

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