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MSc Degree in Environmental Science

NUTMEG DOMINANCE IN KANDYAN HOME GARDENS: BALANCING
OPPORTUNITIES AND THREATS TO BIODIVERSITY AND ECOSYSTEM
SERVICES

A dissertation submitted

by

K. K. Mihiranga

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ABSTRACT

Kandyan home gardens is a well-established and culturally important land use system found in the mid country wet zone especially in and around the Kandy District. This study aims to investigate the dominance of Nutmeg in Kandyan home gardens and their impact on the plant diversity by comparing the species diversity of home gardens that are having and not having Nutmeg trees. Vegetation data were collected using the Point-Centered Quarter Method (PCQM) within home gardens across 10 points along a 50 m transect, and 40 recorded trees. For each plant, the distance from the central point, diameter at breast height (DBH), and tree height were measured. Light intensity at each point was taken using Sper Scientific Advanced Light Meter. Species dominance, diversity, and structure were assessed using standard ecological indices, including relative density, frequency, and basal area. A species abundance matrix within study sites was analyzed using PCORD software, applying Cluster Analysis and Detrended Correspondence Analysis (DCA) to determine species composition patterns across Kandyan home gardens. Biodiversity indices such as richness, diversity, and evenness were computed using Biodiversity Pro software for comparative analysis among sampling sites.

The study revealed significant structural and compositional variation among Kandyan home gardens, particularly influenced by the presence and dominance of nutmeg (*Myristica fragrans*). Nutmeg was found in 78.26% of the sites surveyed, contributing an average of 17.17% to total tree density and 19.75% to overall basal area, indicating its strong ecological presence. Gardens with high nutmeg density exhibited reduced absolute tree density and light intensity, with linear regression showing a moderate negative correlation ($R^2 = 0.343$) between nutmeg density and total tree density, and a strong negative relationship ($R^2 = 0.832$) between nutmeg abundance and understory light levels.

Species diversity was notably lower in nutmeg-dominated sites. Site 22, with the highest nutmeg density, recorded the lowest diversity indices, while more mixed-species sites like Site 8 showed significantly higher richness and evenness. Rarefaction analysis confirmed these trends across varying sampling efforts.

Multivariate analyses reveal clear patterns in species composition. Cluster and DCA analyses grouped home gardens into distinct clusters based on species assemblages, with nutmeg-dominated sites (e.g., S22 and S10) forming separate ecological outliers. Non-metric multidimensional scaling (DCA) ordination confirmed that *Myristica fragrans* strongly influenced site distribution along the primary axis of variation, highlighting its role as a key driver of species composition.

These findings underscore nutmeg's ecological and structural dominance in home gardens, suggesting that while it offers economic benefits, its proliferation may suppress plant diversity and alter microclimatic conditions.