

## EXPERIMENTAL ARTICLE

# A glimpse to botanical garden: Case study in the environment and ecological niche of molave tree

**Renelle V. Caraig\***

Institute of Education, Far Eastern University, Manila, Philippines

**\*Correspondence:**Renelle V. Caraig,  
rvcaraig@up.edu.ph**Received:** 13 May 2023; **Accepted:** 21 July 2023; **Published:** 07 August 2023

A wood species called molave (*Vitex parviflora* Juss.) naturally grows in tropical nations like the Philippines. In the marginal uplands, molave is also a plant that is advised for afforestation. The ecological niche of the molave tree is significant to the balance of the terrestrial ecosystems. The trees serve as producers of the biotic organism and provide shelter, oxygen and sequester carbon dioxide. The trees also provide support that upholds the land from erosion and landslides. According to FAO (2004), people in the county continue to unlawfully cut these trees despite the Philippines' restriction on doing so, which results in an annual deforestation rate of roughly 2.48%, compared to 1.4% in the 1990s. Some of the conservation plans of the government include *in situ* conservation, integrated protected area systems, geographic mapping of species distribution, and education and training activities for conservation planning. Therefore, the molave tree in the Botanical Garden of University of the Philippines Los Banos has a vital role in controlling the balance of the ecosystems together with the living organisms in the area and must be sustained and protected.

**Keywords:** molave tree, ecological niche, conservation plan, deforestation, UPLB.

## Introduction

*Vitex parviflora* is locally known in the Philippines as molave or small flowering chaste tree that came from the family *Verbenaceae* (1). The tree is mostly found in lowland forests that are rather dry, frequently in deciduous forests that are on rocky terrain, grassy slopes and dry limestone soils, although it can also occasionally be found in coastal rain forests or hill forests (2). It is often seen in places like the Philippines, Indonesia and Malaysia that have distinct rainy and dry seasons.

Molave is a medium- to large-sized tree that can reach heights of 30–38°m. Its bole can measure up to 125–200 cm in diameter, and it can grow without branches for up to 20°m. However, it usually grows much shorter and crookedly, with buttresses. Its bark is smooth, shallowly fissured or flaky, and its colour ranges from light grey to light yellowish-brown (3). The wood has a density of 940 kg/m<sup>3</sup> with 15% moisture content, making it tough and long-lasting. It is also resistant

to fungi, termites and lyctus beetles, but not to marine borers. *Vitex* wood is used for high-end construction, flooring, home construction, ship construction, railway sleepers and carving (4).

Since then, these molave have been highly significant to the environment and maintaining the ecological balance of certain ecosystems because of their functions and uses, not only in serving as furniture but also for medical purposes, preventing erosion and absorbing and sequestering carbon sink. In reality, Thailand and the Philippines were the world's top exporters of tropical timber in the 1960s and early 1970s. In the Philippines in 1970, the forestry industry was one of the main sources of revenue, accounting for 12.5% of GDP (5). It changed, nevertheless, in the 1980s when forestry activities started to collapse as a result of overexploitation and the ensuing shortages of wood for fuel and building materials. The forestry industry contributed just 1.3% of the GDP in 1990 (5). In that case, the government, through the Department of Environment and Natural Resources, promotes the use of high-quality planting materials in its

afforestation and other afforestation activities to promote biodiversity conservation in marginal uplands/watershed areas (6) and ensure sustainable production and supply of wood and other forest products in the country. Yet, people continue to engage in illegal forestry practices as a result of overexploitation by large logging firms and agricultural development brought on by population growth.

Amidst to the persistent issues in anthropogenic activities such as illegal logging, burning and pollution emission, this paper will give initiatives on the significance of the molave tree and its ecological niche in the environment, people and the entire biota. Currently, farmers' livelihoods still heavily rely on forest resources, particularly those who live in the uplands where the rate of deterioration is highest. In addition, this will provide information about the conditions of our terrestrial ecosystems and knowledge in land conservation and protection by various approaches/strategies of different studies both locally and globally.

This study tries to pinpoint the ecological niche of the molave tree in the university's botanical garden in Los Baos, Laguna, the Philippines. It also talked about the benefits and impacts of molave trees on the environment. This study facilitated an observation-derived design of research. When conducting observational research, the researcher can see how their subjects behave in the real world in response to various alternatives or scenarios. The expression alludes to the observation and documentation of behavior under non-experimental circumstances. Derived data are produced by aggregating or applying mathematical algorithms to previously collected data points, which are frequently drawn from several data sources. For instance, combining area and population data from the Twin Cities metro region produces population density data.

## Results and discussion

The Philippines previously had a dense forest cover. In 1989, half of the country's land area, or 15 million hectares, was designated as forest. According to the most recent forest inventory [Fernando, (7)], the extent of the forest has now shrunk to around 6.7 million hectares. Approximately 12 million hectares, or 40% of the land area, are thought to be the ideal amount of forest for the Philippines. Since there are now only 6.7 million hectares of forest, 5.3 million hectares of extra land must be reforested (8).

According to (9), the government executes a Master Plan for Forestry Development that seeks to halt deforestation, preserve all virgin (old-growth) forests and effectively and sustainably manage remaining forests and plantations. Plans include the implementation of *in situ* conservation, integrated protected area systems, plus tree selection and *ex situ* conservation by providing conceptual and strategic conservation framework.

According to the Department of Environmental and Natural Resources (DENR) and the Food and Agriculture Organization (FAO), the Philippines' total wooded area is estimated to be 5,790,000 hectares, or 7,162,000 ha. Both sources agree that 829,000 hectares, or 19.41% (DENR) and 11.57% (FAO), of the total forest area are covered by primary forest. Since deforestation rates are outpacing replanting rates, the amount of forest cover in the Philippines is declining. According to FAO (2004), the yearly deforestation rate in the 1990s was 1.4%; however, it is currently about 2.48%. The main element driving up this rate is the widespread use of illicit logging practices across the nation, which became evident after the present logging ban was established in 1992.

The Philippines has changed from being a major exporter to a nation that depends heavily on imported timber in less than 60 years. In 2003, the Philippines imported a substantial amount of timber, ranking as the second-largest International Tropical Timber Organization (ITTO) producer and importer country with 3,56,000 m<sup>3</sup> of logs, 3,38,000 m<sup>3</sup> of sawn wood and 93,000 m<sup>3</sup> of veneer [ITTO, (10)]. According to (10), sawn wood from China and Taiwan as well as veneer from Malaysia and logs from Indonesia, Malaysia and Papua New Guinea are now meeting Philippine demand. The nation depends on imports to meet its domestic wood demands.

Although the situation is beginning to improve and a sizable amount of timber imports from non-tropical places are occurring, the Philippines still rely heavily on tropical timber for a large portion of their imported wood needs. The export data for the Philippines is unclear. The Philippines may have increased veneer production from 3,85,000 m<sup>3</sup> in 2004 to 5,73,000 m<sup>3</sup> in 2005, but the ITTO reports that the country does not appear to have enough logs available to create the claimed amounts of sawn wood, veneer, and plywood.

The transect technique of ecological research was used in the Cabansag (2016) inventory to determine the species composition, variety and richness of a forest sanctuary. The threat to the country's floral resources' biodiversity is explained by the presence of local and indigenous trees and the shrinking area for their growth as a result of the intrusion of quickly spreading alien plant species. Due to their slower growth rate compared to invasive alien trees, the study focused on identifying priority species of native and indigenous trees for the protection of biodiversity. As a forest reserve and natural sanctuary, the research site plays a significant role in maintaining the protection and conservation of these tree species for biodiversity and serves as a natural gene bank for the nation's priority tree species.

In the study conducted by (6), it was discussed that the molave tree is a recommended afforestation species in the marginal upland like in the Botanical Garden of University of the Philippines Los Banos. However, it was shown in the Bohol research that a key obstacle to scaling up the

production of high-quality seedlings of native timber trees in Bohol is the absence of knowledge regarding the location and distribution of excellent molave mother trees. The DENR established the selection criteria (stem straightness, stem forking, branch angle, stem circularity, tree health, branch thickness, and branch persistence). The outcome, however, reveals that the average altitude was 120.9°m above sea level. In Lila, Bohol, the Philippines, there are many excellent mother trees of the molave tree that are capable of producing quality seedlings for reforestation of the Bohol upland areas, notably on the National Greening Program of the Philippine government.

Farmers believe that native trees are significant depending on how valuable they are economically and ecologically (11, 12). In order to provide high-quality posts and lumber for building houses, farmers often regulate and safeguard the natural regeneration of their native trees.

According to (11) and Catorce (1999), smallholders value natural regeneration for protecting soil, especially on farms with steep slopes and for providing shade for valuable cash crops like abaca (*Musa textiles*). But three significant and widespread foreign species, *Gmelina arborea*, *Swietenia macrophylla* and *Leucaena leucocephala*, were also regarded by farmers as having high usefulness. For example, *S. macrophylla* and *G. arborea* may be used to build homes and make furniture. On the contrary, *L. leucocephala* is mostly chosen as fuelwood. These species are very simple to grow and multiply, which is the key factor in their widespread adoption, especially among small farmers (11).

Similar findings were found by (12) on local knowledge of trees, particularly in regards to the tree species that farmers like to use for building, furniture, fuelwood and poles and posts. The preference for tree species was not well characterized in a related study on preferred fuelwood tree species by (13), with the farmers appearing to harvest whatever trees were easily accessible. For instance, farmers employ narra (*Pterocarpus indicus*), a premium species with great value for furniture making.

## Conclusion

These molave have been important to the environment and in maintaining the ecological balance of certain ecosystems for a long time because of their functions and uses, which include not only serving as furniture but also in medical applications, preventing erosion and absorbing and sequestering carbon. In fact, the Philippines and Thailand were the world's biggest exporters of tropical timber in the 1960s and early 1970s. With 12.5% of the nation's gross domestic product in 1970 coming from the forestry industry, the Philippines had one of the highest incomes. However, as a result of overexploitation and the ensuing shortages of lumber and fuel wood in the 1980s, forestry activity started to decline, and the situation changed. In the midst

of to the diligent issues in anthropogenic exercises like unlawful logging, consuming and contamination outflow, this study will give drives on the meaning of the molave tree and its biological specialty in the climate, individuals and the whole biota. At present, the significance of woodland assets plays a significant role in ranchers' job, particularly for those living in the uplands, where the corruption's interaction is more prominent. Additionally, this will give data about the states of out earthbound environments and information on land preservation and insurance through various methodologies/techniques of various investigations both locally and globally.

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