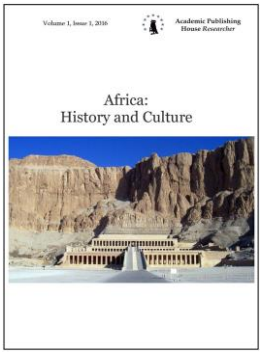
Published in the Slovak Republic
Africa: History and Culture
Has been issued since 2016.
E-ISSN: 2500-3771
2019, 4(1): 33-36

DOI: 10.13187/ahc.2019.1.33
www.ejournal48.com



Azadirachta indica (Neem Tree) for Furniture Production in Ghana: A Historical Review

John Lawer Narh [a, b, *]

[a] Tema Technical Institute, Ghana
[b] Accra Technical University, Ghana

Abstract

Wood as a raw material is essential for economic growth. As the global population increases, it is predicted that the percentage of wood required for human use will triple by 2050. In Ghana, many of our traditional wood species are overexploited and threatened to extinction. Nonetheless, the utilization of other lesser-used and lesser-known wood species needs to be looked at urgently to increase the wood resource base for furniture production. This paper reviewed the historical trends of commercial wood production in Ghana and the possibility of increasing the use of lesser-used species like *Azadirachta indica* (Neem). Notably, neem has been proven as a good substitute for the dwindling species like Odum, Mahogany, Asanfena, Emeri, and Kyenkyen due to its unique properties. Neem is a fast-growing tree and can shed some or all of its leaves and still flourish. Aside from its use for furniture production, Neem is known for its medicinal and agricultural benefits.

Keywords: Azadirachta indica (Neem Tree), Furniture, Ghana, Review.

1. Introduction

Commercial wood production is essential for national and global development. Nonetheless, as the world increases in population, global wood needs are estimated to triple by 2050 to meet the growing need. Thus, the decreasing supply of most commercial wood as raw material inspires the forest products industry to look for other wood species which have similar or greater commercial values but are not currently utilized by the forest products industry (Midgley et al., 2017). There is limited knowledge about the properties of a large proportion of timber-grade wood species. The utilization of lesser utilized timber species as a replacement for the primary commercial wood species has been a matter of discussion for some time now. This is in the light of many efforts by research institutions such as the Forestry Research Institute of Ghana to stop or minimize the extinction of some of the durable timber species due to overexploitation (Hansen, Lund, 2017; Kansanga et al., 2019).

Successful promotion and utilization of lesser-used species (LUS) will yield a relief and reduce demand on the few primary species. But the efficient utilization of the lesser-used wood species depends on knowledge of their physical and mechanical properties (Antwi-Boasiako et al., 2017; Chowdhury et al., 2017; Lumor et al., 2017). It is expected that the efficient utilization of the LUS would improve the sustainability of the tropical timber resources and reduce negative environmental impacts such as a reduction in biodiversity and desertification (Chowdhury et al.,

* Corresponding author
E-mail address: johnlawer1973@gmail.com (J.L. Narh)

2017). Lesser utilized species can be used as substitutes for well-known species which are gradually becoming extinct. An example is Dahoma (*Piptadeniastrum africanum*) which was regarded as the most promising alternative to Odum. Currently, it is successfully being used as a substitute for Odum (*Milicia excelsa*) (Ewudzie et al., 2018).

2. History and Use of *Azadirachta indica* in Ghana

Ghana has considerable wealth in tropical hardwood species. There are about 680 different species of trees in the forest reserves of Ghana (Amissah et al., 2018). Approximately 420 of these trees species obtain timber size and therefore, are of potential economic value. About 126 of them occur in sufficient volumes to be considered exploitable as the raw material base for the timber industries. However, about 90 % of the country's wood exports are covered by 10 species, and only 4 species contribute roughly 60 % of the total production. The lesser-used-species (LUS) occur in abundance in the forest, but increased harvesting must be on a sustainable basis to ensure continued harvesting potential (Antwi-Boasiako et al., 2017; Ewudzie et al., 2018; Nanang, 2010).

Fig. 1. *Azadirachta indica* (neem tree)
Photo credit: balthierbreozoianu via https://imgbin.com/png/yiGUk1r2/neem-tree-photograph-png

Azadirachta indica (neem tree) is an evergreen tree widely distributed in the tropical forest in Ghana and belongs to the family Meliaceae (Mahogany) (see Figure 1). It is a fast-growing tree that reaches a height of 35-40 metres (115-131ft). It can shed some or all of its leaves and still flourish. The tree is described as a hardwood (pored timber) because it bears flowers, its seeds are encased in fruit, it has broad leaves and branches. Azadirachta indica is thought to have originated from Assam and Myanmar where it is common throughout the central dry zone and the Siwalik hills (Bharadwaj, Seth, 2017). However, the exact origin is uncertain and some authors suggest it is native to the dry forest of south and south-east Asia, including Pakistan, Sri Lanka, Thailand, Malaysia and Indonesia (Ahmed, Grainge, 1985).

In the 19th century, neem tree was introduced by Indian immigrants to the Caribbean (i.e. Trinidad and Tobago, Jamaica and Barbados), to South America and the South Pacific (NRC, 1992). The cultivation of neem tree spread to Africa in the 1920s when it was introduced to Ghana, Nigeria and Sudan, and the species is now well established in more than 30 countries. Neem tree can grow in tropical and subtropical regions with semi-arid to humid climates. It will typically experience a mean annual rainfall of 450-1200 mm, mean temperatures of 25-35°C and grow at altitudes up to 800 metres above sea level. The species is drought-tolerant and thrives in many of the drier areas of the world. There is, therefore, considerable interest in neem tree as a means to prevent the spread of deserts and ameliorate desert environments, e.g. in Saudi Arabia (Ahmed, Grainge, 1985) and sub-Saharan Africa (National Research Council, 1992). Many of these trees are used for the production of firewood and charcoal, but other potential uses remain under-exploited.

In recent years, there has been a growing interest in neem tree in Ghana for crop protection, both in the field and storage (Partey et al., 2018). GTZ, through the Goethe Institute in Accra,

has held two conferences, the first in 1998 ('the potential of the neem tree in Ghana') and the second in 1999 ('Commercialization of neem in Ghana'). These conferences have succeeded in promoting awareness of neem to a number of institutions within Ghana and have also helped to network the activities of these institutions. As a result of the conference in 1998, three working groups were set up within Ghana: 'Neem as a pesticide,' 'Neem as a cosmetic' and 'Neem for afforestation'. Over the years, there are millions of neem trees growing in Ghana, especially in the coastal and interior savannahs (Nanang et al., 1997).

3. Potential use of *Azadirachta indica* for Furniture Production in Ghana

Most dealers in Ghana's wood industry have relied mainly on traditional wood species such as Mahogany, Asanfena, Emeri, Kyenkyen, and others for furniture production (Boampong et al., 2015). Thus making these wood species over-exploited and threatened to extinction. Promoting LUS will release the pressure on the few primary timber species. This can help keep timber industries in business in the face of economic extensions of primary species (Chowdhury et al., 2017; Lumor et al., 2017). The utilization of other LUS needs to be looked at as urgently as a possibility of increasing the wood resource base in the country. A successful expansion of the resource base is dependent on adequate knowledge of the properties of LUS (Antwi-Boasiako et al., 2017).

Practically, wood is required to resist loads whenever it is used. It is therefore expedient to examine its behaviour when subjected to many forces or stresses before it can be recommended for use. And therefore mechanical tests and other tests such as extractive content, cell-wall thickness are conducted or designed almost exclusively to obtain data from predicting the performance of the wood material in use (Chowdhury et al., 2017). Also, as prices of the traditional timber increase, and quality and quantities decline, manufacturers and producers have little option other than to pay attention to the lesser-known species which were previously ignored, in order to remain in business (Boampong et al., 2015; Lumor et al., 2017).

Studies decades ago showed that neem wood is aromatic; it is not very lustrous but is easily sawn. It seasons well in open stack placed undercover when it is sawn still wet. It can be worked with both by hand and by machines (Koul et al., 1990; Thengane et al., 1995). Neem timber is durable even in extended exposed conditions and it is not attacked by insects. In addition, it is resistant to termites and woodworms. It has low shrinkage. The wood is moderately heavy, stable and resembles mahogany. The working quality is like that of oak but has straight grains (Antwi-Boasiako et al., 2017; Hummel et al., 2016). These are factors that can lead to their use in furniture production. This species has been left unutilized due to lack of knowledge on its properties such as glue holding power, finishing characteristics, density, modulus of rupture modulus of elasticity and others. It is therefore urgent to assess properties such as moisture content, basic density, compression parallel to the grain, modulus of elasticity, modulus of rupture and shear parallel to the grain of the neem wood to ascertain its possible utilization potentials. There is little hope for the future of the Ghanaian timber trade if diversification of market species is not encouraged to accommodate lesser-known species and to serve as a means for sustainable management of the tropical forest of Ghana (Boampong et al., 2015; Hummel et al., 2016).

4. Conflicts of interest

The author declares no conflicts of interest.

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