



Quick Response Code:



Website: <https://wgges.us>



**Creative Commons (CC BY-NC-SA 4.0):**  
This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Public License, which allows others to remix, tweak, and build upon the work noncommercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Manuscript ID:  
IJWGAFES-2025-020901

DOI: 10.5281/zenodo.17646515

DOI Link:  
<https://doi.org/10.5281/zenodo.17646515>

Volume: 2  
Issue: 9  
September  
Year: 2025  
E-ISSN: 3066-1552

Submitted: 05 Aug. 2025

Revised: 10 Aug. 2025

Accepted: 06 Sept. 2025

Published: 30 Sept. 2025

<sup>1</sup>Department of Environmental Science, Sevalal Mahila Mahavidyalaya and Post Graduate Research Academy, Nagpur, Maharashtra, India  
Email: [bharatitapase2016@gmail.com](mailto:bharatitapase2016@gmail.com)

<sup>2</sup>Department of Environmental Science, Sevalal Mahila Mahavidyalaya and Post Graduate Research Academy, Nagpur, Maharashtra, India  
Email: [prachirajurkar29@gmail.com](mailto:prachirajurkar29@gmail.com)

**Address for correspondence:**  
Dr. Tapase Bharti  
Department of Environmental Science, Sevalal Mahila Mahavidyalaya and Post Graduate Research Academy, Nagpur, Maharashtra, India  
Email: [bharatitapase2016@gmail.com](mailto:bharatitapase2016@gmail.com)

**How to cite this article:**  
Tapase, B., & Suryawanshi, P. (2025). The Global Teak Trade: Market Dynamics and Economic Trends, A Review. *International Journal of World Geology, Geography, Agriculture, Forestry and Environment Sciences*, 2(9), 1–7.  
<https://doi.org/10.5281/zenodo.17646515>

# The Global Teak Trade: Market Dynamics and Economic Trends, A Review

Dr. Tapase Bharti<sup>1</sup>, Suryawanshi Prachi<sup>2</sup>

## Abstract

Teak, a highly valuable tropical timber species, thrives in diverse climates and soil conditions, with its growth performance varying across different regions and plantations. While naturally found in parts of India, Myanmar, Thailand, and Laos, teak plantations have expanded globally, including areas outside their natural range. Known locally as Sagwan, Indian teak wood predominantly originates from the central plateau and Western Ghats, encompassing modern-day Karnataka, Goa, Maharashtra, Madhya Pradesh, and parts of Telangana. It's also found in Assam and the bordering regions of Myanmar, where it's called 'Burma Teak'. Indian teak wood, by its colour, which can be light brown, dark brown, or yellowish, depends on its Indian origin, while its grain pattern varies from delicate to coarse, depending on the chosen piece. Known for its exceptional long-term durability and natural resistance to pests and decay, this teak's superior oil content, attributed to India's rich soil, has earned it global recognition and a higher price than Burmese teak. India plays a dual role in the global teak trade, acting as both a major importer of teak wood and a prominent producer and supplier. Its status as a world leader in teak imports is driven by high domestic demand. In contrast, extensive teak plantations in states such as Maharashtra, Kerala, and Karnataka contribute to its position as a key global supplier of high-quality teak timber. The country's overall standing in the market depends on the specific trade metrics used. Genuine, naturally grown Indian teak wood is available through government auctions at local timber depots, although the government must adhere to strict rules for timber transportation. Indian teak is superior to plantation teak of other countries because it's grown in natural forests, not alongside other crops, and is identifiable by its greater thickness as a log and fetches a higher price in the global market. This study examines the forces that influence the supply and demand of teak wood, providing a comprehensive analysis of the global teak industry. It encompasses the current state of the industry, the factors driving its evolution, and the economic landscape of the teak trade and investment.

**Keywords:** Teak, global teak trade, importer, prominent producer, supplier, global teak industry

## Introduction

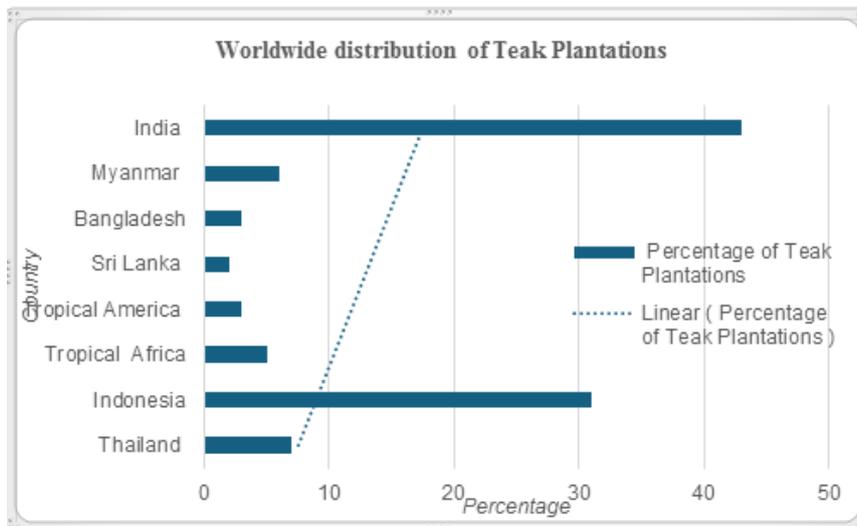
Teak (*Tectona grandis*) is the most sought-after species in India for house construction and furniture making. Teakwood forms the benchmark for the grading and price of other wood species, and traditionally, consumers in India have an exclusive preference for this wood. Teak is native to India, Myanmar, Laos, and Northern Thailand, and there are nearly 8.9 million hectares of teak-bearing forests in India. It is ideally suited to grow as a plantation crop and also as an agroforestry species by small-holding farmers, and is the most preferred species as a bund planting crop by the farmers in India. Timber production from Indian forests has declined over the years, primarily due to an increasing emphasis on the conservation of forests and biodiversity. In fact, the situation has become so dire that the current average annual domestic production of about 2.4 million cubic meters (CBM) is just about 5% of today's demand. Although various government and private players are investing in teak plantations, the fact that teak has long rotation periods and demand is far higher than the additional supply that plantations can generate means imports will continue to remain high, making imports a year-round profitable proposition.

The world's total teak supply from natural and planted forests adds up to about 2-2.5 million CBM, of which at least 60% is cut in India, Indonesia, and Myanmar. The estimated market share of teak logs in the total round wood production is less than 2%. As per FAO, in India, natural teak resources declined from the late 1970s to 2010. India is a dominant force in the global teak trade, consuming the vast majority of teak logs from Africa and Latin America, while also producing a substantial amount domestically. This heavy reliance on the Indian market makes global trade highly sensitive to its economic conditions, leading to market volatility. The lack of a universal log grading system and inconsistent measurement units across countries further complicates teak pricing and trade, creating a complex and inconsistent international market.

This study provides a comprehensive analysis of the global teak industry, examining the factors influencing supply and demand, the industry's current state and evolution, and the economic landscape of teak trade and investment.

### General Description of Teak

Teak (*Tectona grandis*), a tropical hardwood, is native to South and Southeast Asia, growing up to 130 feet tall and 12 feet in diameter. Teak, scientifically known as *Tectona grandis*, has various names across different languages and regions. In English, it's commonly known as teak, Indian oak, or teak tree. Saka, bardaru, bhumisah, dwardaru, kharchhad in Sanskrit. Other names include sagun, sagwan, or saigun in Hindi and other Indian languages, kyun in Burmese, and djati or jati in Indonesian and Malay. Additionally, it's referred to as teck in French and Italian, and teca in Spanish.



**Figure 1-**Worldwide distribution of Teak plantations.

### Scientific classification of Teak

Teak is scientifically classified as follows:



Kingdom	Plantae
Class	Tracheophytes
Order	Lamiales
Family	Lamiaceae
Genus	Tectona
Species	Tectona grandis
Botanical Name	Tectona grandis

**Figure-2** Teak wood slice

### India in the Global Teak Industry

India holds a dual position in the international teak market, acting as both a major consumer, particularly of teak from Myanmar, and a modest exporter of finished products like sawn timber and plywood. However, this trade, especially the portion sourced from Myanmar's natural forests, is under increased scrutiny due to growing worries about unsustainable logging practices and the resulting deforestation.

India, despite having domestic teak production and a high regard for teak furniture, relies on imports to meet its substantial demand due to a combination of factors: a large population, a Supreme Court ban on felling natural trees, and the impossibility of factory-based teak production, leading to a supply-demand imbalance.

India is a major teak producer and a huge consumer, importing significant quantities to meet its massive domestic demand, especially for interior applications and high-quality timber. The trade is characterized by high domestic utilization, volatile global prices linked to Indian demand, and large-scale private teak investment programs. Key issues include the widespread prevalence of unethical investment schemes, the significant and often problematic import of "conflict teak" from Myanmar, and the need for better regulation and sustainability in the industry. Moreover, the timber industry's need for vast storage and processing areas, a need that is uniquely met by the ample vacant land found near major ports like Kandla and Mangalore.

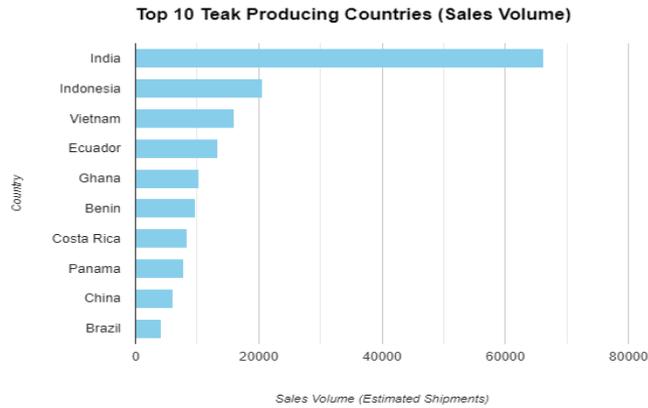


Figure.3- Top ten teak-producing countries

### Production and Demand of Wood in India

Approximately 102 million cubic meters of small-sized wood were produced in 2023–2024. It was estimated to be worth approximately INR 482 billion. Approximately 37 billion cubic meters of medium- and large-sized timber were produced. It was estimated to be worth approximately INR 359 billion. The Indian wood market is projected to reach USD 22.5 billion by 2029, up from an anticipated USD 14.77 billion in 2024, at a compound annual growth rate (CAGR) of 8.78%. The growing demand for wood, which includes the growth of wood-using industries like construction, paper, and packaging, is one of the primary causes.

The most common wood HS codes in the Indian wood export market are as follows:

S. N	Code	Description
1	4409	Wood, comprising parquet friezes and strips
2	4411	Wood or other ligneous fibreboard, whether it is bonded with resins or other organic elements.
3	4421	Other articles of wood.
4	44039990	Cut Wood, chipped, sliced, or peeled longitudinally, whether or not it has been enjoyed, sanded, or planed, and thicker than 6 mm.

### Export and Import policy of wood in India

India's wood export and import are regulated under the Foreign Trade (Development and Regulation) Act 1992 and the associated Foreign Trade Policy (FTP), administered by the Directorate General of Foreign Trade (DGFT). Key aspects include a mandatory Importer-Exporter code (IEC) for traders, the need for authorisations for restricted items, and a general principle that all trade is free unless specifically prohibited or restricted by the FTP.

**Exports:** India's trade rules for timber are liberal regarding imports but restrictive on exports, specifically prohibiting the export of raw logs to serve conservation goals.

**Imports:** India's trade policy for teak is designed to promote domestic value addition and discourage local logging. The country imports teak logs at a lower tariff (25%) than processed wood products (31%) to incentivize domestic manufacturing and reduce pressure on its forests. Despite being a major producer, India is a net importer of teak to satisfy its demand for value-added products. The major teak wood import ports in India are Bangalore ICD, JNPT, Madras Sea port, Cochin Sea port, and Delhi TKD ICD.

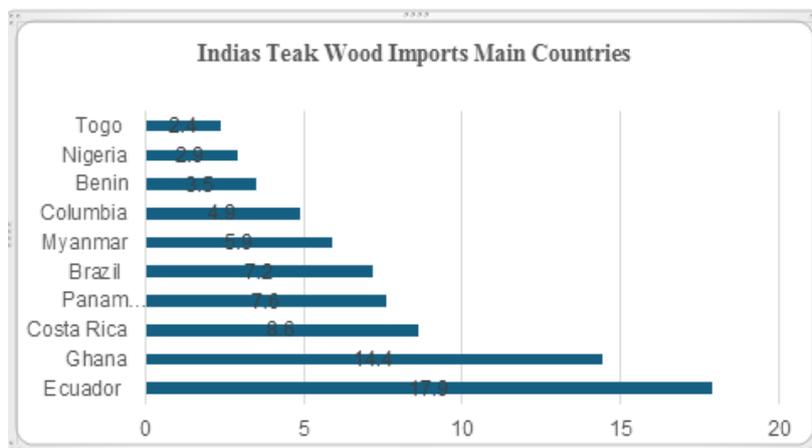


Figure 4- India's Teak Wood Imports: Main Countries

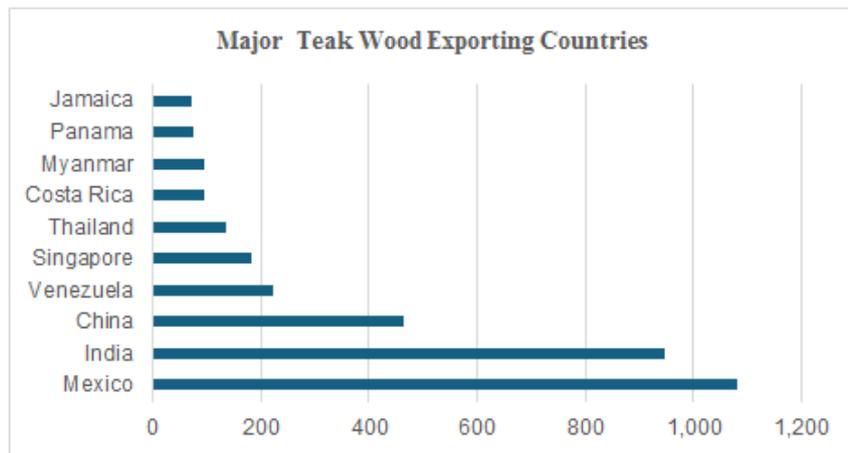


Figure 5- Major Teak Wood Exporting Countries

### Factors influencing the supply and demand of teak timber in India

Factors influencing India's teak timber include high domestic demand from construction and furniture, limited local supply due to exploitation and deforestation, and declining levels of production of teak logs from natural forests due to the continuing deforestation and depletion of natural teak resources. India is also likely to see a continuing decline in the volume and quality of natural teak, accompanied by progressive loss of genetic resources, and increasing reliance on imports. Government policies, such as export regulations on other countries' teak and incentives for Indian plantations, affect availability and price. Environmental concerns and the push for sustainable sourcing can restrict supply, while inflation and import costs influence the price of imported logs.

### Economic landscape of the teak trade and investment

The teak market is undergoing a significant transition as the supply shifts from natural forests to plantations to meet strong global demand, particularly in Asia. This move has attracted significant investment due to teak's reliability as a long-term asset. However, the sector is challenged by the inconsistent quality of timber from younger plantations, along with complex pricing structures and regulatory issues.

### The global teak market and trade dynamics

The global teak market was worth \$44.0 billion in 2023 and is projected to more than double to \$93.22 billion by 2032, with an 8.7% compound annual growth rate (CAGR). The teak furniture segment, which was valued at \$58.9 billion in 2023, is predicted to expand at a 6.2% CAGR by 2030.

### Major players and trade flows:

1. India, a major driver of the global teak market, consumes most of the plantation teak exported from Africa and Latin America. Both India and China are leading importers, accounting for the bulk of worldwide teak exports.
2. Asia holds over 90% of the world's teak resources, and trends in the Asian market govern the global trade.
3. Myanmar was historically the dominant supplier of premium natural teak. However, an export ban on raw logs imposed in 2014, due to resource depletion, has reduced its global trade share.
4. Indonesia primarily exports finished teak products, such as furniture, to markets in China and Europe.
5. Africa and Latin America are emerging as key suppliers of plantation-grown teak logs, targeting Asian markets.

### Economic drivers and opportunities

#### 1. High and consistent demand

Teak is prized for its durability, water resistance, and aesthetic qualities, making demand almost unlimited for applications like high-end furniture, boatbuilding, and flooring. A rising middle class in emerging markets and increasing home renovation trends in developed economies further boost demand.

#### 2. Investment diversification

Teak plantation investments are increasingly seen as a safe, long-term hedge against volatile financial markets. As a tangible asset with low correlation to traditional stocks and bonds, teak can add stability to a diversified investment portfolio.

#### 3. Long-term appreciation

Due to its long growth cycle and consistent demand, teak timber, especially from mature, high-quality trees, appreciates over time. This makes it an attractive generational wealth asset for long-term investors.

#### 4. Sustainable and ethical value

Growing environmental awareness has increased the market for sustainably and ethically sourced timber. Investments in responsibly managed and certified plantations, such as those with Forest Stewardship Council (FSC) certification, are becoming more attractive to environmentally conscious consumers and regulators.

### Risks and Challenges

#### 1. Inconsistent quality

Unlike old-growth natural teak, timber from fast-growing, young plantations often has smaller dimensions and lower quality. This can impact the market value and limit applications that require large, premium-grade wood.

## 2. **Supply chain complexity**

Stringent regulations, including logging restrictions and sustainability requirements, can complicate the teak supply chain. The long maturity period of 20 to 50 years makes investments susceptible to policy changes and market fluctuations.

## 3. **Investment scams**

The promise of high returns from teak plantations has attracted unscrupulous companies, especially in India, that lure investors with unrealistic projections. This has led to financial losses and tarnished the reputation of the sector.

## 4. **Pricing opacity**

The lack of a common international log-grading standard and variation in measurement units make it difficult to compare teak prices across countries. This lack of transparency can create confusion and prevent accurate price determination.

## 5. **Environmental concerns**

Historical deforestation and monoculture plantation practices raise environmental issues, including loss of biodiversity and soil degradation. Illegal logging remains a concern in some regions, further hindering sustainable trade.

## **Conclusion:**

This review depicted that the teak is indeed a highly important species. The global teak timber market is undergoing a significant transformation, moving from a supply-constrained trade based on natural forests to a plantation-centric model. Key insights reveal that Asia, led by India and China, will continue to be the primary market driver, with demand shifting towards smaller, faster-grown plantation logs. While this change offers supply stability, market participants must navigate challenges related to product quality from younger plantations and the lack of international price standards. Addressing ongoing challenges, such as illegal logging and inconsistent grading standards, will be crucial for the industry's orderly and sustainable development. It is anticipated that increasing pressure for sustainable practices and certification as a market entry requirement, particularly in Western markets. Ultimately, future profitability depends on investing in robust silvicultural management, embracing transparency, and navigating policy environments to maximize returns from this highly valued timber. Ministry of Environment, Forest and Climate Change(MOEF&CC) of India is now of the view that there is an imminent need to make concerted efforts at every level in mission mode to improve research, cultivation, harvesting, and marketing of teak. It is the apt time to initiate the process of augmenting teakwood in India so that by 2047, on the 100<sup>th</sup> year of independence, the country is self-sufficient in teakwood production.

## **Acknowledgement**

I am Ms. Prachi V. Suryawanshi, thankful to the Associate Professor, Dr. Bharati Tapase, Department of Environmental Science, Sevadal Mahila Mahavidyalaya, Rashtra Santa Tukdoji Maharaj Nagpur University, Nagpur, for granting permission to carry out this work.

## **Financial support and sponsorship**

Nil.

## **Conflicts of interest**

The authors declare that there are no conflicts of interest regarding the publication of this paper.

## **References:**

1. Aderounmu, A. F., Nkemnkeng, F. J. and Anjah, G. M. 2020. Effects of seed provenance and growth media on the growth performance of *Vitellaria paradoxa* C.F. Gaertn. *International Journal of Biological and Chemical Sciences*, 14: 2659-2669.
2. Ambebe, T. F., Agbor, A. E. W. and Siohdjie, C. H. S. 2018. Effect of different growth media on sprouting and early growth of cutting-propagated *Cordia africana* (Lam.). *International Journal of Forest, Animal and Fisheries Research*, 2: 28-33.
3. Amonum, J. I., Niambe, O. K. and Japheth, H. D. 2019. Effect of planting media on the germination and early growth of *Dacryodes Edulis* (G. Don) H. J. Lam. *International Journal of Forestry and Horticulture*, 5: 6-11.
4. Ashiono, F. A., Wangechi, H. K. and Kinyanjui, M. J. 2017. Effects of Sawdust, Forest Soil and Cow Dung Mixtures on Growth Characteristics of Blue Gum (*Eucalyptus saligna*) Seedlings in South Kinangop Forest, Nyandarua, Kenya *Open Journal of Forestry*, 7: 373-387.
5. Ball, J. B., Pandey, D. and Hirai, S. 1999. Global overview of teak plantation. In: *Regional Seminar on Site, technology and Productivity of Teak plantation*, Chiang Mai, Thailand, pp. 1-14.
6. Bermejo I, Isabel, Canellas I & Miguel A.S. 2003. Growth & yield models for teak Plantations in Costa Rica. *Forest Ecology and Management*, 189: 97-110.
7. Bhat, K.M. and Hwan. O. M. 2004. Teak Growers Unite. *Wood Science Division Kerala Forest Research Institute and ITTO Tropical Forest Update* 14/1, 2004, 1-5
8. Bhatnagar, H.P. 1966. Effect of light intensity on growth and uptake of nutrients in some forest tree species. *Indian Forester*, 92: 79-84.
9. Bloch, P. 1958. Thailand forest soils. *Natural History Bulletin of The Siam Society (NHBSS)*19: 45-56
10. Brandis, D. 1906. *Indian Trees*. Archibald Constable & Co.
11. Champion, H. G. and Seth, S.K. 1968. *A Revised survey of the forest types of India*: 113-117, 181- 184. Manager of Publications, Delhi
12. Daldoum, D. M. A. and Hammad, G. H. 2015. Performance of *Acacia senegal* (L.) Wild seedlings growth under some tree manures and NPK fertilizers in nursery site. *Journal of Environmental Science*, 31: 303-311.

13. Dao, H. T. T., Seo, J. M., Hernandez, J. O., Han, S. H., Youn, W. B., An, J. Y. and Park, B. B. 2020. Effective Placement Methods of Vermicompost Application in Urban Tree Species: Implications for Sustainable Urban Afforestation. *Sustainability*, 12: 5822; doi:10.3390/su12145822
14. Deb, J.C., Phinn, S., Butt, N. and McAlpine, C.A. 2017. Climatic-induced shifts in the distribution of teak (*Tectona grandis*) in tropical Asia: implications for forest management and planning. *Environmental Management*, 60(3): 422-435.
15. Drechsel, P., Schmal, S. and Zech, W. 1991. Relationship between growth, mineral nutrition and soils in young teak plantations in Benin and Liberia. *Water, Air, & Soil Pollution*. 54: 651-656.
16. Emperor, G. N. and Kumar, K. 2015. Microbial population and activity on vermicompost of *Eudrilus eugeniae* and *Eisenia fetida* in different concentrations of tea waste with cow dung and kitchen waste mixture. *International Journal of Current Microbiology and Applied Science*, 4: 496-507.
17. Garner, E. 2014. Sawdust as a mulch and soil amendment for Rhododendrons and Azaleas. In: Roberts AN, Bulletin ARS (eds). *Journal American Rhododendron Society*, 5: 58.
18. Guleria, V. 2006. Effect of farm yard manure application on the growth and nutrient dynamics of *Albizia chinensis* Merr. under nursery conditions. *International Journal of Agricultural Science*, 2: 599-600.
19. Haig, I.T., Hubermann M.A. and Aung D. U. 1958. *Tropical Silviculture*, Vol 1. F.A.O. Rome, 190
20. Hlaing Z. and Telyakov V. 2013. The growth of teak (*Tectona grandis* Linn.f) plantations at the age of 10-, 15-, and 20-years Old in Bago and Paukkaung townships IUFRO. 2018.
21. India State of Forest Report (ISFR); 2019. Shrivastava S, Saxena AK. Wood is good, but is India doing enough to meet its present and future needs? Centre for Science and Environment, New Delhi; 2017.
22. Kaosa-ard, A. 1977. Physiological studies of sprouting of teak (*Tactona grandis* Linn.) plant stump. Ph. D. Thesis. Australian National University, Australia.
23. Kaosa-ard, A. 1986. Teak (*Tectona grandis* Linn. f.) in ASEAN: a survey report. ASEAN/Canada Forest Seed Centre, MuakLek, Saraburi, Thailand, 60.
24. Kaosa-ard, A. 1998. Overview of Problems in Teak Plantation Establishment. In: M. Kashio, and K. White, (Eds.), *Teak for the Future*. Bangkok: RAP Publication: 1998/5, FAO Regional Office for Asia and the Pacific, 49-60.
25. Kermodé, C.W.O. 1957. Teak. In: *Tropical Silviculture 2*: 168-192, Food and Agricultural Organization, Rome.
26. Khadijah, M. D., Amina, A. Y. and Lawan, G. M. 2020. Evaluation of the effect of different growing media on emergence and seedling growth of Pawpaw (*Carica papaya*). *Journal of Agriculture and Veterinary Science*, 13: 27-35.
27. Kulkarni, D.H. 1951. Distribution of teak (*Tectona grandis*) on the northern slopes of the Satpuras, with special relation to geology. *Proc. Eight Silvie. Conf.* 254- 263. Dehra Dun.
28. Kyaw, T.Y., Germain, R.H., Stehman, S.V. and Quackenbush, L.J., 2020. Quantifying forest loss and forest degradation in Myanmar's "home of teak." *Canadian Journal of Forest Research*, 50(2): 89-101.
29. Lazcano, C., Sampedro, L., Zas, R. and Domínguez, J. 2010. Vermicompost enhances germination of the maritime pine (*Pinus pinaster* Ait.). *New Forests*, DOI: 10.1007/s11056-009-9178-z.
30. Luna, R.K. 1996. *Plantation Trees*. International Book Distributors, Dehradun, India.
31. Mahapol, S. 1954. Teak in Thailand. Royal Forest Department., Thailand, No. R.16, p. 31.
32. Mahmoud, T. Sh. M., Nabila, E. K., Abou Rayya, M. S. and Eisa, R. A. 2019. Effect of planting dates and different growing media on seed germination and growth of pistachio seedlings. *Bulletin of the National Research Centre*, 43:133.
33. Masilamani, P., Balasubramaniam, P., Albert, V. A. and Govindaraj, M. 2019. Growth of teak (*Tectona grandis* Linn.f) stumps in bagasse fly ash incorporated medium. *Indian Forester*, 145: 455-458.
34. Mathowa, T., Bosenakitso, M., Mojeremane, W., Mpofu, C. and Legwaila, G. M. 2014. Effect of growing media on seedling growth of African baobab (*Adansonia digitata* L.). *International Journal of Advance Research in Biological Science*, 1: 94–104.
35. Mhango, J., Akinnifesi, F. K., Mng'omba, S. A. and Sileshi, G. 2008. Effect of growing medium on early growth and survival of *Uapaca kirkiana* Müell Arg. seedlings in Malawi. *African Journal of Biotechnology*, 7: 2197- 2202.
36. Mohapatra S. C., Kaosa-ard, A. 1981. Teak (*Tectona grandis* Linn. f.); its natural distribution and related factors. *Natural History Bulletin of the Siam Society*. 29: 55 - 74.
37. Mohapatra, S. C. and Das, T. K. 2009. Integrated effect of bio-fertilizers and organic manure on turmeric (*Curcuma longa* L.). *Environment and Ecology*, 27:1444–1445.
38. Murugesan, S., Avudainayagam, S. and Masilamani, P. 2014. Effect of bagasse fly ash incorporated nursery media on seedling growth of Pungam (*Pongamia pinnata* Roxb.). *Journal of Non-Timber Forest Products*, 21: 27-32.
39. Mwadalu, R. U., Mochoge, B. and Danga, B. 2020. Effects of biochar and manure on soil properties and growth of *Casuarina equisetifolia* seedlings at the coastal region of Kenya. *Scientific Research and Essays*, 15: 52-63.
40. Nahida, Ansari S H & Siddiqui A N 2012. *Pistacia Lentiscus*: A Review on Phytochemistry & Pharmacological Properties. *International Journal of Pharmacy and Pharmaceutical Science*, 4(4): 16-20.
41. Nair, P.K.R. 1983. Tree integration on farmlands for the sustained productivity of small holdings. In. W. Lockertz (ed). *Environmentally sound Agriculture*, Prager. New York, N.Y. 333-350.
42. Nandi, Aparajita, P.K. Basu, & S.K. Banerjee. 1991. Modification of some soil properties of *Eucalyptus* Sp. *Indian For.*, 117(1): 53-57.
43. Narain, P., R. Singh & K. Singh. 1990, Influence of forest covers on physicochemical and site characteristics in Doon Valley. *Indian Forester.*, 116: 901-915.
44. Noory, F. A., Patil, S. V., Rao, V., Ramanna, M., Kadalli, G. G. and Swetha B. S. 2022. Effects of Humic Acid, Vermiwash, and Biofertilizer on Seedling Growth of Ghising et al., *Biological Forum – An International Journal* 14(3): 322-330.

45. Nwoboshi, L.C., 1970. Studies on nutrient cycle in forest plantations: preliminary observations on litter fall & macronutrient return in a teak (*Tectona grandis* L.f.) plantation. *Nigerian Journal of Science*, 4 (2), 231–237.
46. Odoom, F.K. 1998. Hardwood plantations in Ghana. Case study for FAO project GCP/INT/628/UK.
47. Osamn, K.T. & N. M. Rahman, 1995, effect of forest plantation on soil properties at Keochia Silvicultural research station Chittagoan. *Indian Forester.*, 121(2): 1108- 1117.
48. Pandey. D. and Brown. C. 2002. Teak: a global overview. *International Journal of Forestry Research*, 51: 1-15.
49. Perez, D. 2005. Effect of thinning on stem form and wood characteristics of Teak (*Tectona grandis*) in a humid tropical site in Costa Rica. *Silva Fennica* 39(2): 217-225.
50. Perez, D., and Kanninen, M., 2005. Stand Growth Scenarios for *Tectona grandis* plantations in Costa Rica. *Forest Ecology and Management*, 210: 425-441.
51. Rizanti, D.E., Darmawan, W., George, B., Merlin, A., Dumarcay, S., Chapuis, H., Gérardin, C., Gelhaye, E., Raharivelomanana, P., Sari, R.K. and Syafii, W. 2018. Comparison of teak wood properties according to forest management: short versus long rotation. *Annals of Forest Science*, 75(2): 39.
52. Saha, S. 2001. Vegetation composition and structure of *Tectona grandis* plantation and dry deciduous forest in Central India. *Forest Ecology and Management* 148: 159-167.
53. Shahapurmath, G., Hanumatha, M., Gunaga, R., Rashmi, V. and Koppad, A. 2016. Growth and productivity of *Tectona grandis* Linn. f. in plantations and farmlands in coastal zone of Karnataka (India). *Journal of Applied and Natural Science*, 8 (4): 1919-1923.
54. Singh, A., Husain, M. and Ali, S. R. 2018. Effect of container type and growing media on germination and seedling growth parameters at nursery stage in allepo pine in Kashmir Valley, India. *Flora and Fauna*, 24: 211-217.
55. Sondarva, R. L., Prajapati, V. M., Mehta, N. D., Bhusara, J. and Bhatt, B. K. 2017. Effect of various growing media on early seedling growth in *Khaya senegalensis* (Desr.) A. Juss. *International Journal of Current Microbiology and Applied Science*, 6: 3290-3294.
56. Sulisty J, Hata T, Lukmandaru G, Syafriani Y and Honma 2021. Catalytic process in producing green aromatics through fast pyrolysis of wood of five tropical fast growing trees species. *Wood Research Journal*, 12(1):18–27.
57. Suthari S, Kanneboyena O, Kiran E., Tarakeswara M, Rao R, and Nallella S 2023 Natural Gum and Resin Bearing Plant Taxa in Telangana, India: A Qualitative Method of Data Collection. *Journal of Plant Science Research*, 39 (2):153–166.
58. Suwannapinant W, 2001. Silvicultural Systems. Third ed. Department of Silviculture, Faculty of Forestry, Kasetsart Uuniversity, Bangkok, Thailand,
59. Syofuna, A, Banana A.Y and Nakabonge G 2012. Efficiency of natural wood extractives as wood preservatives against termite attack. *Maderas Ciencia y Tecnología*, 14(2): 155–163.
60. Teak (*Tectona grandis* Linn. f.): its natural distribution & related factors. *Natural History Bulletin of the Siam Society*, 29, 55–74.
61. Tewari, D.N. 1992. A monograph on teak (*Tectona grandis* Linn. f.). Dehra Dun, India, International Book Distributors.
62. Tripathi D, Tripathi A, Singh S & Singh Y, 2017. Accumulation and toxicity of silver nanoparticles in autotrophic plants, and heterotrophic microbes: a concentric review. *Frontiers in Microbiology* 8: 7-9.
63. Troup, R.S. 1921. The silviculture of Indian trees, Vol. 2. Oxford, UK, Clarendon Press.
64. Vadiraj, B.A. & N. Rudrappa, 1990, Studies on the nutrient status of soil under different plantations., *My Forest*, 262: 325-330.
65. Varier P S 1996. *Indian Medicinal Plants: A compendium of 500 species*. Vol 5. Orient Longman, Hyderabad, India, 245-248.
66. Wood industry in Indonesia – statistics & facts, Vol. 2023. New York: Statista Research Department, 2023.
67. Yan A, and Zhong Chen 2019. Impacts of silver nanoparticles on plants: a focus on the phytotoxicity and underlying mechanism. *International Journal of Molecular Sciences*, (20) :1003.
68. You-yu Syu, Jui-Hung Hung, Jui-Chang Chen and Huey-wen Chuang 2014. Impacts of size and shape of silver nanoparticles on *Arabidopsis* plant growth and gene expression. *Plant physiology and biochemistry* 83:57-64.