

From these sticks small clear specimens were selected for conducting the physical and mechanical tests in green, kiln dry and/or air-dry conditions.

3) **Procedure for calculation of specific gravity of the samples :** Samples from an undamaged portion of wood from the bending test were taken for determination of specific gravity at test which was used for developing NIR calibrations. The test specimens were 2 x 2 cm in cross section and 6 cm in length. Specimens were weighed to an accuracy of 0.001g and dimensions were measured correct to 0.01 cm. Volume was calculated by multiplying all three dimensions. The specimen was weighed correct to 0.001 gm. The Dimensions of rectangular specimen were measured correct to 0.01 gm and volume was calculated.

Specific Gravity = $\frac{\text{weight of specimen}}{\text{volume of the specimen}} \times \frac{100}{100 + \text{Moisture Content}}$

4) **Results and Conclusion:** Determination of physical and mechanical properties of logs of different flowering trees of *T. undulata* as per standard test methods indicate that strength properties under various stresses like compressive stress, tensile stress, shear stress vary significantly among yellow, red and orange flowering tree logs of this species. The strength of yellow, red and orange flower trees was analyzed and it shows that red flower strength data is significantly different from other two flowers trees which might be due to the changes in specific gravity (Specific Gravity red-0.67, yellow-0.63, orange-0.60). This is the first report for wood property analysis with reference to three different morphotypes in *T. undulata*.

Specific gravity of *Tecomella undulata*

Property	Red	Yellow	Orange
Specific gravity	0.67 ± 0.03	0.63 ± 0.05	0.60 ± 0.01

Results of the study revealed strength properties of *T. undulata* are on par with *Tectona grandis* (Teak) in all the properties. It was observed that hardness of *T. undulata* is generally higher than *Tectona grandis* (Teak) but shear and tension of the former species is very poor in comparison to the latter species. It was also observed that safe working stresses for structural uses of *T. undulata* are higher except in one property i.e. fiber stress at elastic limit perpendicular to grain than those of *Tectona grandis*. As per IS 3629 (Anon. 1988). *T. undulata* was found suitable for all purposes and superior to Teak in all the properties except shear and tension. It was found heavier and has given higher values of properties in comparison to other light to moderately heavy plantation timbers i.e., *Anthocephalus chinensis* (Kadam), *Populus deltoides* (Poplar) and *Melia azedarach* (Bakainj). According to the present system of grouping of timbers *T. undulata* is a heavy, very hardy, very strong, tough and highly steady timber. Besides the uses for which it is being already utilized it seems suitable for construction works, door and window frames and for such other purposes where heavy and hard timbers are required and load bearing capacity is an important consideration.

Acknowledge

The financial assistance from the Indian Council of Forestry Research and Education, Ministry of Environment, Forestry and Climate Change and Government of India is gratefully acknowledged. Author are also grateful to Director, ICFRE-Arid Forest Research Institute, Jodhpur, Director, Forest Research Institute, Dehradun, Forest Department, Rajasthan and Co-PI s of the project for their support in extending the facilities,in collection of wood samples, testing of physical and mechanical properties and other project related activities.



Published by
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Funded by :
National Authority CAMPA-2025,
MOEF&CC, Government of India
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Properties and Utilization of
Wood of *Tecomella undulata*
(Rohida) An Important
Timber Yielding Tree
Species of Rajasthan



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INDIAN COUNCIL OF FORESTRY

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(AN AUTONOMOUS BODY OF MOEF&CC, GOVT. OF INDIA)

Introduction

Tecomella undulata (Rohida) is an important timber yielding tree species of arid and semi-arid region. It is a deciduous tree attaining the height of about 7 to 14m with drooping branches and greyish-green leaves. This species is listed as a threatened species due to overexploitation for wood and medicinal use and habitat loss. It thrives well in the harsh climatic conditions of the desert, making it an indispensable part of the flora in Rajasthan's arid landscape. Rohida produces three types of flowers (orange, red, and yellow) from late November and



***Tecomella undulata* Tree** continues up to the April end and bears fruits, thereafter. Due to variability in flower colour, Rohida is recognized as “State flower” in Rajasthan. The total flowering duration varies from 59-103 days for the individual tree and 135 days for the whole population. Asynchronous type of flowering with peak flowering between February to March (i.e. 9 to 19 days) has been reported in this species. Variable dark color flower in Rohida and nectar collected at the base of the flower inside the corolla attracts the birds and other insects for pollination. The flowers are entomophilous and ornithophilous in nature and honeybees and Martin birds are the major pollinators in *T. undulata*. The wood of Rohida is of high commercial value and wood quality is equivalent of Teak thus also known “Marwar Teak” of Rajasthan.

Utilization of *Tecomella undulata*

1. **Timber Use:** Wood obtained from Rohida tree is soft, durable strong and resilient. The color of the wood varies from greyish to yellowish brown and the specific gravity is found to be of 0.57 to 0.83. Timber of this species is classified as heavy, moderately strong, not tough, very stable, moderately hard



Different flower color morphotypes of *Tecomella undulata*

and recommended for furniture, doors, window shutters, frames, tool handles, agricultural implements, pallets, handicrafts and preparation of carom draughts.

2. **Handicrafts and Art:** The quality wood of Rohida is used for handicrafts and wood carving and valued in carpentry and joinery work. It is extensively used in Rajasthan for traditional woodcraft and preferred for decorative wooden panels, temple furniture, and religious idols.
3. **Medicinal Uses:** The plant parts of Rohida are known for its traditional medicine use. Bark of the tree contains alkanes, heart wood contains iridoid glycosides 6-o-veratroyl catalposide and tecomelloside and flowers contain flavonoids which are of medicinally important. The bark is used for decoction for digestive disorders and leaves for skin infections and wounds.
4. **Ecological Importance:** Rohida is drought resistance species and survives well in extreme heat and low rainfall. It plays a major role in soil conservation by binding the soil in degraded lands and used in afforestation and desertification control. This species also provides shade and shelter in arid landscapes and attracts pollinators like bees and birds during flowering season.

Wood Properties of *Tecomella undulata*

Property	Details
Color	Freshly cut wood is golden yellow to light brown; darkens with age
Grain	Mostly straight, sometimes slightly interlocked
Texture	Fine to medium, smooth to the touch
Luster	Moderate natural sheen, takes polish well
Hardness	Moderately hard; strong and wear-resistant
Density (Air Dry)	Around 640–720 kg/m³
Durability	Highly durable, even in exposed conditions
Termite Resistance	Excellent – naturally resistant to termites and wood-boring insects
Fungal Resistance	Good resistance to fungal decay and rot
Shrinkage	Low – minimal shrinkage and movement after seasoning
Workability	Easy to saw, turn, chisel, carve, and polish
Seasoning	Seasons well without warping or checking
Nail/Screw Holding	Good holding strength; does not split easily
Machinability	Excellent – ideal for both manual and machine processing
Odor	No unpleasant odor, safe for indoor furniture
Sound/Vibration Property	Good acoustic properties – sometimes used in musical instruments

Work carried out at ICFRE-AFRI, Jodhpur

T. undulata exists in nature with three different flower morphotypes. This species is a timber species so to find out whether the variation exists between the woods of these three morphotypes or not, physical and mechanical properties like specific gravity, modules of elasticity, modulus of rupture, Hardness (N), Shear Strength Parallel to grain, Tension Parallel to grain, Elasticity, Compression Parallel to grain, Compression Perpendicular to grain were studied under the ICFRE-funded project “Studies on phenology, molecular

analysis and wood properties of *Tecomella undulata* with respect to three flower colour morphotypes” for the first time.

- 1) **Preparation of samples:** Nine trees were marked at Mohangarh, Jaisalmer IGNP area based on the different flower color morphotypes during the flowering period (November-December 2018) and logs of approx. 1m were prepared with the help of State Forest Department for further studies.



(A) Tree marked at Jaisalmer (B) Felling of the marked tree (C) Approx. 1m log for testing wood properties

- 2) **Conversion of Logs into Sticks:** All logs were marked on the mall end (top end) into 6 x 6cm squares and sawn into nominal 6 x 6cm scantlings parallel to pith-to-pith axis. Each log was divided into bolts of 1.5m length and each bolt was indicated by a letter of the alphabet in order, beginning with the one nearer the stump. When the sticks were taken out, each test stick have the complete identity mark of consignment number, tree number, the bolt designation and the stick number. All the connected sticks were matched for tests in the green and dry conditions as follows:

Green: All even numbered sticks from upper bolt and odd numbered sticks from lower Bolt.

Dry: All even numbered sticks from lower bolt and odd numbered sticks from upper Bolt.



Marking and Conversion of Logs into Sticks