



## Journal of Medicinal Plants Studies

### Dalbergia Sissoo- Variability in Morphology

Mamta Bhattacharya <sup>1</sup>, Archana Singh, <sup>2</sup> Chhaya Ramrakhyani <sup>3</sup>

1. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030  
[Email: [mab\\_61@rediffmail.com](mailto:mab_61@rediffmail.com), Tel: 0755-2641855]
2. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030  
[Email: [drsingharchana@rediffmail.com](mailto:drsingharchana@rediffmail.com), Tel: 0755-2770136]
3. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030  
[Email: [cramrakhyani@gmail.com](mailto:cramrakhyani@gmail.com), Tel: 9630660650]

---

*Dalbergia Sissoo*, an Indian rosewood which is a deciduous forest tree. It is natively found in Indian subcontinent. It is called as Shisham which is best known premier timber tree. It is also used as fuel wood with its multiple product uses and agro-forestry application, it is consider as best timber wood tree. *Dalbergia* morphology had variation which had been dealed in this paper also with its multiple uses.

---

**Keyword:** Indian Rosewood; Shisham Agro-forestry application morphology.

---

#### 1. Introduction

*Dalbergia Sissoo* known as sisu, shisham, tahli, iruguduyam, Jag at different parts of world. It is native to the India, Pakistan, Burma, Sri Lanka and Mauritius. In India it is grown at central Himalayas hill side. The northern rang of India, in state of Punjab at India and Pakistan both. It grows along the hilly area, beds of river banks with rich alluvium soil. It grows as elevation of 3000ft. Its trees are from 30 m to 80 m height <sup>[1]</sup>. Shisham is best known internationally for timber wood. The wood differs with species. On average account heartwood is golden to dark brown and the sapwood is while to brown which is durable, tough and resistant. It is used to forestry as application of aorestation. The tree is planted on roadsides and shade tree for tea plantations. Its morphology had great variation to leaf, pods flowers. It has excellent coppicing ability. It has long taproot system and surface root system with suckers for propagation <sup>[2]</sup>.

#### 2. Scientific Classification

<i>Dalbergia Sissoo</i> <sup>[3]</sup>	
Kingdom	- Plantae
Unranked	- Angiosperma
Unranked	- Ecidicots
Unranked	- Rosids
Order	- Fabales
Family	- Fabaceae
Sub Family	- Faboideae
Tribe	- Dalbergia
Genus	- <i>Dalbergia</i>
Species	- <i>Sissoo</i>

#### 3. Taxonomical Classification <sup>[4]</sup>

Domain	- Eukaryota
Kingdom	- Plantae
Division	- Magnoliophyta
Phylum	- Tracheophyta

Tribe - Dalbergieae  
 Genus - *Dalbergia*  
 Species - *Sissoo*  
**Binomial Name** - *Dalbergia Sissoo DC.*

**4. Synonyms** <sup>[5]</sup>.

Amermnon *Sissoo* (Roxb.) Kuntze  
 Amerimnon P. Browne  
 Ecastaphyllum P. Browne  
 Coroyo Pierre  
 Triptolemea Mart

**5. Common Names** <sup>[6]</sup>.

Sanskrit - Shinsapa, Aguru  
 English - Indian Rosewood  
 Bombay Blackwood  
 Hindi - Shisham, sissu,  
 sissai, sisam  
 Tamil - *Sisso*, gette  
 Kannada - Betti, shista baage  
 agaru, bindi  
 Bengali - Shishu, *Sissoo*  
 French - Ebenier Juane  
 Arabic - Arabic  
 Indonesia - du Khaek  
 Pradu Khaek  
 Javanese - Sonowaseso  
 Spanish - Sisu  
 Thai - du-Khaek  
 Pradu Khaek  
 Persian - Jag  
 Trade Name - *Sissoo*

**6. Morphology**

**(i) Macromorphology** <sup>[7]</sup>.

Height - 45 to 60 feet  
 Spread - 30 to 40 feet  
 Crown Uniformity - Irregular Outline  
 or Silhouette  
 Crown Shape - Oval  
 Crown Density - Open  
 Growth Rate - Fast  
 Texture - Medium

**(ii) Foliage** <sup>[8]</sup>.

Leaf Arrangement - Alternate

Leaf Type - Odd pinnately compound  
 Leaflet Margin - Entire  
 Leaflet Shape - Elliptic (Oval)  
 Orbiculate  
 Leaflet Venetion - Pinnate  
 Leaf type and - Semigreen  
 Persisteant  
 Leaflet blade length - 2 to 4 inches  
 Leaf colour - Green (dark)  
 Fall Colour - No change

**(iii) Flower** <sup>[9]</sup>.

Flower colour - White  
 Flower characteristics - Pleasant, fragrance,  
 inconspicuous and not showy spring flowering.

**(iv) Fruit** <sup>[10]</sup>.

Shape - Elongated; pod  
 Length - 3 to 6 inches; general  
 1 to 3 inches  
 Fruit covering - dry or hard  
 Fruit - does not attract  
 characteristics wildlife;  
 not showy; persistent  
 on tree.

**(v) Trunk and Branches** <sup>[11]</sup>.

**Trunk/bark/branches:-**

Bark is thin and easily damaged from mechanical impact, droop as the tree grows and will require pruning for vehicular, not showy, no thorns.

Wood - breaks or cracks  
 weak stem  
 Twig colour - brown-older ones  
 green - younger ones  
 Twig thickness- medium  
 Light cast - The tree casts light  
 shade due to the  
 open canopy.

Wood - Hard, heavy, strong durable, elastic, decay, resistant.

**(vi) Light Requirement** <sup>[12]</sup>

Tree grows in part shade/part sun; or tree grows in full sun.

**Soil tolerance** - clay, loam, sand, acidic, occasionally wet, well-drained.

**Draught tolerance** - moderate

Aerosol salt tolerance - low

Roots - tap root system  
\surface roots

**(vii) Habitat** <sup>[13]</sup>.

Temperature varies from 39 to 49 °C – maximum 4 to 6 °C – minimum rainfall varies from - 760 to 457 mm.

**(viii) Soil state** <sup>[14]</sup>.

1. Typical alluvial ground soil.
2. Beds of river.
3. Sand or gravel soil.
4. Often gregariously.
5. Porous well irrigated soil.
6. Adequate moisture
7. Often grown in hilly cliffs.
8. It is moisture losing species.
9. Morphology variation in different seasons and on same plant.

**(ix) Leaf Variation** <sup>[15]</sup>.

Two types morphotypes have been identified.

- (i) Very small leaflet
- (ii) Large leaf
- (iii) Average size of leaves recorded with scale manually.

**(x) Leaf** <sup>[15]</sup>.

Pinnately compound swollen base  
Rachis - 3.4 - 9 cm long  
Leaflet - 3-5 in number  
Petiole - 3.5 - 6 mm  
Small leaves - 2.69 - 0.27 cm length  
- 2.19-0.26 mm breadth

Average length - 5.44 - 0.28 cm  
Average breadth - 4.91 - 0.22 cm

**(xi) Branching** <sup>[16]</sup>.

Branching ranged from upright branching to looping type pattern.  
Bark colour - brown to black

**(xii) Flowering intensity** <sup>[17]</sup>.

Trees with very dense flowering and very thin flowering were also identified.  
Difference was identified in flowering period also. The change of flowers observed due to environmental changes. Trees bears more flowers, bears more pods while those bears less flowers bears less pods

**Flowering behaviour**

Flowering starts

- (a) Initiation - 2<sup>nd</sup> week of March
- (b) Peak - 1<sup>st</sup> week of April
- (c) Decline - 4<sup>th</sup> week of April

**(xiii) Inflorescence** <sup>[18]</sup>.

An axillary panicle composed of several short spikes with sessile to sub sessile flowers.  
7-14 in a twig of inflorescence.

**Flower** - Pea shaped  
toothed calyx  
5-petals  
include - 2 wings,  
1-standard, 2- kell.  
colour - white to yellowish.  
variability: change from  
white to yellow.

**After pollination:** yellow to orange -  
yellowish.

**Androecium** - 9-stamens  
united to a broad stalk  
monadelphous  
5 large + 4 small

Petals size - 0.9 - 0.7 cm  
Length of stamens- 0.79 to 0.2 cm

- Gynoecium (pistil) - Hairy  
 - 0.85 - 0.69 cm  
 Ovary stalked  
 ovules - 5-6  
 style - short  
 stigma - dot like

Anthesis data on flower opening.

Opening time - 10.00 hrs to 14.00 hrs. with a peak between 11.30 to 13.30 hrs.

Dehiscence of anthers - mornings hours  
 stigma - Shiny and sticky

- Pallor grains - 3 zonocolpate  
 thin walled  
 spherical  
 size - 10.2 µm to 0.11 µm

Pollination - 56%

Mode of Pollination - by insects and birds when the flowers were in stage of withering self-pollination. Pollination in bud stage effective.

**(xiv) Pods** <sup>[19]</sup>.

- Number - 4,7 or 5.  
 Length - 4.7 to 5 cm  
 Breadth - 7.4 mm to 7.48 mm

100 pod weight = 6.459 to 8.315 gm

Average = 7.055 gm

- Number of seeds in pods - 1 to 4 seeds  
 Cotyledons - endospermic  
 - funicle attachment to the pod wall  
 At maturity - Testa becomes hard and brown in colour.  
 - dehydration takes place  
 Colour - brown to black

**(xv) Distribution in India** <sup>[20]</sup>.

*Dalbergia Sissoo* is Indian rosewood tree, it is timber species of India, grows naturally, planted on alluvial soil, widely distributed on river in

beds in sub-Himalayan tract from Indus to Assam and Himalayan valleys.

Grows at 900 m tract to 1500 m.

Grows pure or mixed species *khair-Sissoo* (*Acacia catechu*)

Found in - Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Uttar Pradesh, Delhi, Bihar, Orissa, West Bengal, Sikkim, Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Meghalaya, Tripura, Madhya Pradesh, Gujarat, Maharashtra. Andhra Pradesh, Pondicherry, Tamil Nadu, Karnataka, Kerala

**(xvi) Alien Range** <sup>[21]</sup>.

- Atlantic Ocean  
 Australia  
 Benin  
 Cameroon  
 Costa Rica  
 Cyprus  
 Ethiopia  
 French Polynesia  
 Gabon  
 Ghana  
 Indonesia  
 Iraq  
 Kenya  
 Mauritius  
 New Caledonia  
 Nigeria  
 Senegal  
 South Africa  
 Sri Lanka  
 Sudan  
 Taiwan  
 Tanzania  
 Thailand  
 Togo  
 USA  
 Zimbabwe

**Native Range**

Bhutan, India, Myanmar, Nepal, Oman, Pakistan

**(xvii) Uses** <sup>[22-25]</sup>.

**A) Beneficial impact to environment**

- (a) Check soil erosion due to root system.
- (b) Fixes nitrogen of atmosphere through Rhizobium bacteria in root nodules
- (c) Leaf litter accumulates and decomposes contributes to soil fertility by adding nitrogen, potassium, iron, manganese and organic carbon.

**B) At fences of field - was not found to be inhibitory on germination.**

**C) Timber tree:** Wood is important timber, decorative, fragrant wood, aromatic oil.

*Dalbergia decipularis* - Cream coloured with red or saloman stripes used in crossbanding.

*D. Sissoo* - Indian rosewood used for furniture, wood is strong, durable and tough, for plywoods, bridge piles, sport goods, railway sleepers, decorative carvings.

*D. Melanoxylon* - Making musical instrument and cabinets

*D. latifolia* - for making chess pieces.

**(xviii) Fuel wood -**

Sapwood and heartwood is excellent calorific value 4,908 Kcals/kg sap wood and 5,181 Kcals/kg heartwood.

**(xix) Toxicology**

Ethanollic extract of the fruit of *D. Sissoo* exhibited molluscicide effect against eggs of the freshwater, snail, biomphalaria pfeifferi.

**(xx) Leaflets, Leaf branches as fodder**

**(xxi) Sulphate pulp** from wood of *Dalbergia Sissoo* is used in producing, writing and printing paper.

**7. Conclusion**

*Dalbergia* a timber tree of India has many species and called by different names at different parts of country. It grows at hilly area and river banks in

alluvium soil. It has efficient bearing of temperature from low to high. Its morphology varies at a great range. It is called by Shisham tree which is best timber tree of India. It has wide use to agro-forestry, timber, paper industry, musical instrument and decorative carving. It is also grown as shade and shelter tree.

**8. References**

1. Gupta GJP. Enzymes Involved in Phenol Metabolism of Gall and Normal Tissues of Insect Induced Leaf of Economically Important Plants in Rajasthan India. Bioscience Discovery 2011; 2(3):345-347.
2. Ahmad *et al.* Levels of Total Amino Acids, Soluble Proteins and Phenolic Compounds in Forages in Relation to Requirments of Ruminants Grazing in the Salt Range (Punjab), Pakistan. Pakistan Journal of Botany 2009; 41(3):1521-1526.
3. Mukerjee SK, Saroja T, Seshadri TR. Dalbergichromene: A new neoflavonoid from stem- bark and heartwood of *Dalbergia Sissoo*, Tetrahedron 1971; 27(4):799-803.
4. Pooja, Sharma P, Samanta KC, Garg V. Pharmacophore Evaluation of Nitric Oxide and Hydrogen Peroxide Scavenging Activity of *Dalbergia Sissoo* Roots. Pharmacophore 2010; 1(2):77-81.
5. Vikrant A, Arya ML. A Review on Anti-Inflammatory Plant Barks, International Journal of Pharm Tech Research 2011; 3(2):899-908.
6. Mohammad A, Kumar A. Phytochemical Investigation and Evaluation of Antinociceptive Activity of Ethanolic Extract of *Dalbergia Sissoo* (Roxb.) Bark 2011; 2(1):76-79.
7. Sharma A, Chibber SC, Chawla HM. Caviunin 7-O-gentiobioside from *Dalbergia Sissoo* pods. Phytochemistry 1979; 18(1):1253-1253.
8. Chihiro I. New cinnamylphenols from *Dalbergia* species with cancer chemopreventive activity. J Nat Prod 2003; 66(1):1574-1577.
9. Prasad D. Sustainable Pests Management, Edn 1, Daya Publishing House, New Delhi, 2007.
10. Celestino Santos-Buelga, Maria Teresa Escribano-Bailon, Vincenzo Lattanzio. Recent Advances in Polyphenol Research. Edn 2, Wiley Publishers, United Kingdom, 2010.
11. Qadri R *et al.* Comparative study of free amino acids from root nodules of four tree legume

- species. Journal of applied botany and food sciences 2010; 83(2):148-150.
12. Hilditch TP, Williams PN. The Chemical Constitution of Natural Fats, Ed 4, Spottiswoode, Ballantyne & Co. Ltd., Greatbritain, 1964.
  13. Wang *et al.* Distribution, Synthesis and Biological Activity of Dalbergin. Natural Product Research and Development 2009; 21(5):900-904.
  14. Ramireddy *et al.* O-Prenylated flavonoids from *Dalbergia Sissoo*. Phytochemistry 2008; 11(1):23-26.
  15. Kumar SM, Kumud U. Anti-inflammatory Activity of Root of *Dalbergia Sissoo* (Rox.b) in Carrageenan- Induced Paw Edema in Rats. Pharmacognosy Journal 2010; 2(11):427-430.
  16. Krishnamurty HG, Sarma KG, Seshadri TR. Dalbergenone from the heartwood of *Dalbergia Sissoo*. Current science 1963; 454-455.
  17. Upwar NK. Evaluation of anthelmintic activity of *Dalbergia Sissoo* roxb. International Journal of Pharmaceutical Science and Research 2011; 2(1):171-174.
  18. Hocking D. Trees for Dry lands. Oxford & IBH Publishing Co, New Delhi, 1993; 454-453.
  19. Ingham JL, Kokinen A, Lounasmaa M. Progress in the Chemistry of Natural Organic Products. Springer, Wien/New York 1983; 43:1-200.
  20. Jackson JY. Manual of Afforestation in Nepal. Nepal United Kingdom Forest Research Project. Department of Forest, Kathmandu, Nepal, 1987, 199-214.
  21. James A. *Dalbergia Sissoo* Roxb. ex DC. Purdue University, Center for New Crops and Plant Products, 2000, 311.
  22. Javaid A, Bajwa R, Anjum T. Identification of some more phenotypes of Shisham (*Dalbergia Sissoo* Roxb.) and their response to dieback and wilt diseases. University of the Punjab, Quaid-e-Azam Campus, Lahore, Pakistan, 2004, 2(2):55-59.
  23. Joker D. *Dalbergia Sissoo* Roxb. ex DC. Seed leaflet, Danida Forest Seed Centre, Denmark; 2002; 65:2.
  24. Kamaluddin MA. Genetic improvement and propagation strategy for *Dalbergia Sissoo* in Bangladesh. Bangladesh Journal of Forest Science 1995; 24(2):54-61.
  25. Kanak S, Sahai K. Studies on seed position and their effect on germination and seedling survival in *Dalbergia Sissoo* Roxb. Indian Forester 1994; 120:464-465.