Dalbergia Sissoo- Variability in Morphology

Mamta Bhattacharya ¹, Archana Singh, ² Chhaya Ramrakhyani ³

1. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030
[Email: mab_61@rediffmail.com, Tel: 0755-2641855]
2. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030
[Email: drsingharchana@rediffmail.com, Tel: 0755-2770136]
3. Sadhu Vaswani College, Bairagarh, Bhopal, India – 462030
[Email: 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 dealt 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 [¹]. 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 white to brown which is durable, tough and resistant. It is used to forestry as application of aforestation. 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 [²].

2. **Scientific Classification**

*Dalbergia Sissoo* [³]

- **Kingdom**: Plantae
- **Unranked**: Angiosperma
- **Unranked**: Ecidicots
- **Unranked**: Rosids
- **Order**: Fabales
- **Family**: Fabaceae
- **Sub Family**: Faboideae
- **Tribe**: Dalbergia
- **Genus**: Dalbergia
- **Species**: Sissoo

3. **Taxonomical Classification** [⁴]

- **Domain**: Eukaryota
- **Kingdom**: Plantae
- **Division**: Magnoliophyta
- **Phylum**: Tracheophyta
Tribe - Dalbergieae
Genus - Dalbergia
Species - Sissoo
**Binomial Name - Dalbergia Sissoo DC.**

4. Synonyms [5].
Amermnon *Sissoo* (Roxb.) Kuntze
Amerimon P. Browne
Ecastaphyllum P. Browne
Coroyo Pierre
Triptolemea Mart

5. Common Names [6].
Sanskrit - Shinshapa, 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 - *Sissoo*
Indonesia - du Khaek
Javanese - Sonowaseso
Spanish - Sisu
Thai - du-Khaek
Persian - Jag
Trade Name - *Sissoo*

6. Morphology
(i) Macromorphology [7].
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 [8].
Leaf Arrangement - Alternate

(iii) Flower [9].
Flower colour - White
Flower characteristics - Pleasant, fragrance, inconspicuous and not showy spring flowering.

(iv) Fruit [10].
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 [11].
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
Twig colour - brown-older 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 [12]
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  -  tape root system
\( \text{and surface roots} \)

(vii) Habitat [13].
Temperature varies from 39 to 49 °C – maximum 4 to 6 °C – minimum rainfall varies from - 760 to 457 mm.

(viii) Soil state [14].
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 [15].
Two types morphotypes have been identified.
(i) Very small leaflet
(ii) Large leaf
(iii) Average size of leaves recorded with scale manually.

(x) Leaf [15].
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 [16].
Branching ranged from upright branching to looping type pattern.
Bark colour - brown to black

(xii) Flowering intensity [17].
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\text{nd} week of March
(b) Peak - 1\text{st} week of April
(c) Decline - 4\text{th} week of April

(xiii) Inflorescence [18].
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 (pistle)  -  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
Pallon grains - 3 zonocolpate thin walled spherical
  size - 10.2 μm to 0.11 μm
Pollination - 56%

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

(xiv) Pods [19].
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 [20].
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 grom 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, Karanataka, Kerala
  (xvi) Alien Range [21].
  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\textsuperscript{[22-25]}

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
Ethanol 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

11. Qadri R *et al.* Comparative study of free amino acids from root nodules of four tree legume...