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Bridelia retusa (L.) A. Juss.

Taxonomy and nomenclature
Species name: *Bridelia retusa* (L.) A. Juss.
Family name: Phyllanthaceae (formerly in Euphorbiaceae)
Synonyms: *Bridelia cinerascens* Gehrm., *Bridelia crenulata* Roxb., *Clutia retusa* L.
Vernacular (common name): Kosai, kaji, kasi

Distribution and habitat
The tree is native to India, Bangladesh, Nepal, Sri Lanka, Southern China, and Southeast Asia. In India it is distributed throughout the country up to 2000m in the south and 1000m in the north. The plant is found in dry evergreen or deciduous forests and is a common associate in sal forests but is never gregarious. It tolerates moderate shade. It is affected by frost but can recover from it. The plant is reported to be resistant to fire in regularly burnt grassy savannahs. It produces root-suckers and it is a good coppicer. It grows in sandy-loamy soil, granite or basalt-derived sandy soil and limestone. The plant is moderately drought-resistant and is capable of surviving on dry shallow soil.

Use
The tree yields a valuable timber known in the trade as Kasi. The wood is moderately heavy and moderately hard. It seasons without serious defects and is classed as a non-refractory timber. It is fairly durable and can be used as a substitute for sal and teak. It saws well, works to a smooth surface, and is suitable for turnery and carving. The wood is used for constructional work for making posts, beams, flooring, ceiling, furniture, agricultural implements, rafters, floorboards, and toolhandles. It is also used for the manufacture of cement-bonded wood wool board. The bark contains 16-40 percent tannin and is used for tanning. The leaves are used as fodder. Fruits, leaves, roots, and bark are used in traditional medicine. The roots and bark are astringent. The bark is used as a liniment with gingelly oil in rheumatism. The bark is also used in fever, Jaundice, and for removal of urinary concretion. Leaves are used as antibiotics, analgesics, and anti-inflammatory.

Botanical description
It is a medium to large deciduous tree with sporadic crown. Up to 20m height with 20-40 cm dbh. Bark grey or brown exfoliating in irregular flakes; blaze red; young trees armed with strong conical spines.Leaves simple, alternate; lateral, lanceolate or ovate-lanceolate; petiole stout, pubescent when young; lamina broadly elliptic, oblong, elliptic-oblong, or elliptic lanceolate; acute or shortly accuminate apex, subacute or rounded at base, margin entire or slightly crenulate, bright green and glabrous above, finely tomentose beneath, lateral nerves 14-25 pairs, parallel, prominent, dichotomously forked near the margin. Flowers unisexual; greenish-yellow, sessile or shortly pedicellate, in clusters on long, terminal or axillary paniculate spikes; bracts scaly.Male flowers 7 mm across, tepals 10, biseriate, valvate; outer tepals 3 mm long, ovate-lanceolate, thick, truncate, acute, inner ones obovate, cuneate, obtuse, fimbriate; stamens 5, exerted; anthers oblong. Female flowers: 6.5 mm across, tepals 10, biseriate, lanceolate, valvate; outer and inner 2.5 and 1.5 mm long, coriaceous, truncate, fimbriate, acute; ovary half inferior, globose, ovules 2 in each cell; styles 2, forked.

Figure 1. Old line drawing of leaves and flowers

Fruit and seed description

Fruit is a drupe, edible, globose, fleshy, 7-8 mm across, shining, smooth, purplish-black, seated on the persistent, slightly enlarged calyx. Pyrenes 2 with one seed in each, epicarp crustaceous.15-17 thousand seeds per kg.

Figure 2. Left: Fruits. Right: Stem trunk with characteristic branch thorn

Flowering and fruiting habit

Monoecious. The species shows temporal dioecy (synchronized dichogamy or second-order dichogamy) where the same plant produces male and female flowers in alternating synchronous sequences within a single flowering season. The interval between male or female phases in *B. retusa* is about one week with little or no overlap between the phases. There was variation between individuals and between populations in the number of sex alterations. Flowering occurs in April-August. Fruiting occurs in December-January. Seeds are dispersed by birds.

Seed collection

Mature fruits are collected by plucking from trees or by lopping off branches. Fruit maturation starts in December. The optimum period for collection is when the fruit color turns black and the fruit pulp becomes soft.

Processing and handling

The fruit pulp is removed by macerating in wire-mesh and the seeds are washed thoroughly in running water. Cleaned seeds are then dried in shade.

Dormancy and pretreatment

Seeds have immature embryo dormancy. For the removal of dormancy, the seeds should be after-ripened by storing at 35-40ºC at 7-9% moisture content in closed polythene bags for four-five months before sowing. Germination percentage is about 40-70% against 2-10% for the non-treated seeds.

Storage and viability

Seeds can tolerate desiccation to 4-5% moisture content and freezing temperature hence can be categorized as orthodox seeds. The seed is viable for at least two years if stored at freezing temperature (0°C) with 4-5% moisture content. At ambient temperature (15-46°C), seed viability can be maintained for up to one year with the same moisture content.

Sowing and germination

Sowing is done in the nursery in the month of May-June. Germination is epigeal. Seeds are sown at a depth of 0.6 to 1 cm in lines about 6 to 8 cm apart and the distance between seeds is 5 cm. Germination of treated seeds is 10-12 days. Seedlings are pulled out at three-leaves-stage and transplanted in polybags (10 inches x 6 inches) under shade. Seedlings are watered once a day, weeding and spray of insecticides are carried out as per requirement. The seedlings' growth at the initial stages is very slow and they become ready for plantation after one year. Apart from seedlings, it is also possible to raise *B. retusa* from hardwood cuttings: 20-30 cm long and 1 cm thick, taken in the dormant season between December and January

Pest and diseases

A lepidopteran pest, *Coladenia indrani* is recorded on *Bridelia retusa*. *Acanthaleyrodes elevates* is another species. *Colletotrichum gloeosporioides*a, a facultative fungal parasite causes small brown spots on young leaves. Gradually lesions increase covering almost the whole leaf surface. The seriously affected leaf showed curling and rotting. *Camposporium goureae* and *Periconia byssoides*are are the other fungi found infecting the leaves.

Selected readings

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