Acacia auriculiformis

A. Cunn. ex Benth.

Fabaceae - Mimosoideae

Australian wattle

LOCAL NAMES
Bengali (akash mono,sonajhuri); English (Japanese acacia,Australian wattle,coast wattle,Darwin black wattle,earleaf acacia,earpod black wattle,earpod wattle,wattle,tan wattle,northern black wattle,Papua wattle); Filipino (auri); Hindi (sonajhuri,kasia,akashmoni,northern black wattle); Indonesian (akasai,kasia,akasia,ki hia); Malay (kasia,akasia kuning); Swahili (mkesia); Thai (krathin-narong); Trade name (Australian wattle); Vietnamese (smach'té:hes)

BOTANIC DESCRIPTION
Acacia auriculiformis is an evergreen tree that grows between to 15-30 m tall, with a trunk up to 12 m long and 50 cm in diameter. It has dense foliage with an open, spreading crown. The trunk is crooked and the bark vertically fissured. Roots are shallow and spreading.

Leaves 10-16 cm long and 1.5-2.5 cm wide with 3-8 parallel nerves, thick, leathery and curved.

Flowers are 8 cm long and in pairs, creamy yellow and sweet scented.

Pods are about 6.5 x 1.5 cm, flat, cartilaginous, glaucous, transversely veined with undulate margins. They are initially straight but on maturity become twisted with irregular spirals. Seeds are transversely held in the pod, broadly ovate to elliptical, about 4-6 x 3-4 mm.

The generic name acacia comes from the Greek word 'akis' meaning a point or a barb and the specific epithet comes from the Latin 'auricula'- external ear of animals and 'forma- form, figure or shape, in allusion to the shape of the pod.

BIOLOGY
Acacia auriculiformis is hermaphroditic and pollinated by a wide range of insects including Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera, which forage mainly on pollen.

Seed pods at Hamakuapoko,
Maui, Hawaii (Forest and Kim Starr)

Bark at Hamakuapoko,
Maui, Hawaii (Forest and Kim Starr)

Leaves and seed pods at Hamakuapoko,
Maui, Hawaii (Forest and Kim Starr)

ECOLOGY
A. auriculiformis occurs from near sea level to 400 m, but is most common at elevation less than 80 m. It is predominantly found in the seasonally dry tropical lowlands in the humid and sub-humid zones. The mean annual rainfall in its natural range varies from 700-2000 mm, and the dry season (i.e. monthly rainfall less than 40 mm) may be 7 months. The mean maximum temperature of the hottest month is 32-34 deg C and the mean minimum of the coolest month is 17-22 deg C.
The species is commonly riparian, i.e. ringing perennial rivers and semi-perennial creeks, and tends to form discontinuous populations along drainage systems.

Seedlings have the ability to compete with Imperata cylindrica during early growth phases and once mature may reduce the grass to a sparse ground cover.

Frost does not occur in its natural range, but elsewhere, it tolerates light frost. It does not tolerate shade, and strong wind easily breaks its branches.

BIOPHYSICAL LIMITS
Altitude: 0-500(1 000) m
Mean annual temperature: 24-38 deg. C
Mean annual rainfall: (650) 760-2 000 (6 000) mm
Soil type: Found most commonly on clay soils, it exhibits the ability to grow in a variety of soils including calcareous sands and black cracking clays, seasonally waterlogged soils, sandy loams and coral rag. It can also tolerate highly alkaline and saline soils, pH ranging between 4.3 and 9.

DOCUMENTED SPECIES DISTRIBUTION

Native: Australia, Indonesia, Papua New Guinea

Exotic: Cambodia, Cameroon, China, Democratic Republic of Congo, India, Japan, Kenya, Malawi, Malaysia, Nigeria, Philippines, Tanzania, Thailand, Uganda, Zanzibar, Zimbabwe

The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Fodder: Not widely used as fodder, but in India 1-year-old plantations are browsed by cattle.

Apiculture: The flowers are a source of pollen for honey production.

Fuel: A major source of firewood, its dense wood and high energy (calorific value of 4500-4900 kcal/kg) contribute to its popularity. It provides very good charcoal that glows well with little smoke and does not spark.

Fibre: The wood is extensively used for paper pulp. Plantation-grown trees have been found promising for the production of unbleached kraft pulp and high-quality, neutral, sulphite semi-chemical pulp. Large-scale plantations have already been established, as in Kerala, India, for the production of pulp.

Timber: The sapwood is yellow; the heartwood light brown to dark red, straight grained and reasonably durable. The wood has a high basic density (500-650 kg/m^3), is fine-grained, often attractively figured and finishes well. It is excellent for turnery articles, toys, carom coins, chessmen and handicrafts. Also used for furniture, joinery, tool handles, and for construction if trees of suitable girth are available.

Tannin or dyestuff: The bark contains sufficient tannin (13-25%) for commercial exploitation and contains 6-14% of a natural dye suitable for the soga-batik industry. In India, the bark is collected locally for use as tanning material. A natural dye, used in the batik textile industry in Indonesia, is also extracted from the bark.

Other products: An edible mushroom, Tylopylus fellus, is common in plantations of A. auriculiformis in Thailand.

SERVICES
Erosion control: Its spreading, superficial and densely matted root system makes A. auriculiformis suitable for stabilizing eroded land.

Shade or shelter: The dense, dark-green foliage, which remains throughout the dry season, makes it an excellent shade tree. Planted to provide shelter on beaches and beachfronts.

Reclamation: The spreading, densely-matted root system stabilizes eroding land. Its rapid early growth, even on infertile sites, and tolerance of both highly acidic and alkaline soils make it popular for stabilizing and revegetating mine spoils.

Soil improver: Plantations of A. auriculiformis improve soil physio-chemical properties such as water-holding capacity, organic carbon, nitrogen and potassium through litter fall. Its phyllodes provide a good, long-lasting mulch.

Nitrogen fixing: Acacia auriculiformis can fix nitrogen after nodulating with a range of Rhizobium and Bradyrhizobium strains. It also has associations with both ecto- and endo-mycorrhizal fungi.

Ornamental: It is used for shade and ornamental purposes in cities where its hardiness, dense foliage and bright yellow flowers are positive attributes.

Intercropping: The effect of intercropping with annual crops varies. Increased tree growth has been found with kenaf (Hibiscus cannabinus), upland rice and groundnut in Thailand; reduced growth with maize in Cameroon.

TREE MANAGEMENT
Newly emerged seedlings should receive 50% shade. Once they are established, 70% full sunlight is optimal. In genera, 3-4 months are needed to raise transplantable seedlings that are 25 cm tall. The optimal planting density is not clearly established. Most current plantings are spaced at 2-4 x 2-4 m, the closer spacing being more suitable for firewood and pulp plantations. Removal of lower branches and of young plants has been suggested as a means of improving stem form and of reducing the incidence of multiple stems. A. auriculiformis responds well to pollarding. Young trees respond to coppicing better than old trees, but the tree does not sprout vigorously or prolifically. Best results are obtained if the stump is cut at a height of 0.6-1 m above the ground. Under favourable conditions, trees may reach a height of 15 m in 5 years and produce an annual wood increment of 15-20 cubic m/ha over 10-12 years. An increment in height of 2-4 m per year in the first few years is common even on soils of low fertility. On relatively fertile Javanese soils receiving 2 000 mm annual rainfall, a mean annual increment of 15-20 m^3/ha is obtainable but on less fertile or highly eroded sites the increment is reduced to 8-12 m^3/ha. Recommended rotation is 4-5 years for fuelwood, 8-10 years for pulp and 12-15 years for timber. One or two thinnings are required with longer rotations, depending on initial spacing, site quality and tree growth.

GERMPLASM MANAGEMENT
Seed storage behaviour is orthodox; seeds retain viability for several years. There are approximately 55 000-75 000 seeds/kg.

PESTS AND DISEASES
Damage by pests and diseases is minor. In Indonesia, growth rate has been impaired by a rust fungus, Uromyces digitatus; in India, root rot caused by a fungus (Ganoderma lucidum) has been reported. A beetle (Sinoxylon spp.) can girdle young stems and branches, causing them to break. The insect is of concern, because the tree will develop multiple leaders if the main stem is damaged and the length of the bole will be reduced.

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