Acacia mearnsii

De Wild.

black wattle

Fabaceae - Mimosoideae

LOCAL NAMES
Amharic (mimosa); English (green wattle,tan wattle,Australian acacia,black wattle,late black wattle); French (acacie noir); German (gerber- Akazie); Indonesian (akasia); Italian (Mimosa di Mearns); Japanese (wattor-ju); Spanish (acacia negra,Aromo negro); Swahili (muwati,mwati); Tamil (chavuku); Trade name (black wattle)

BOTANIC DESCRIPTION
Acacia mearnsii is a small to large, evergreen, single-stemmed or multi-branched tree, 6-25 m high, with a straight trunk, growing to 50 cm in diameter; crown low, spreading, rounded; spines absent; bark brownish-black, hard and fissured; twigs angled, grey, densely hairy, tinged with yellow when young. Trees in their natural habitat have a spreading, rounded crown, but are erect and slender when crowded in plantations.

Leaves dark green, alternate, feathery, with very soft hair, binnately compound, 8-15 cm long, with 8-21 pairs of pinnae 2-5 cm long, a round gland at base of each pair on upper surface; leaflets very numerous; 20-70 pairs of pinnae on each axis; small, crowded, narrowly oblong, 3 mm long, blunt, with dense soft hairs, yellowish when young becoming dark green, 1.5-4 x 0.5-0.75 mm; petiole 1.5-2.5 cm long, often with a gland above; rachis usually 4-12 cm long, with numerous raised glands all along its upper side both at and between insertions of pinnae pairs. The tree exhibits a superficial root system.

Flower clusters (racemes) along axis at leaf base or terminal, composed of many (20-30) stalked, pale yellow balls (heads) 7-8 mm in diameter; flowers many, tiny, very sweet scented, composed of narrow 5-lobed calyx; corolla of 5 petals; stamens many, threadlike, pale yellow; pistil with long, slender style 2-6 mm long.

Pods (legumes) narrowly oblong, flat, rough, blackish, with fine hair, fairly straight, 5-15 cm long by 4-9 mm wide but often constricted between the seeds, almost moniliform (in Australia pods less moniliform and almost glabrous are found), dehiscing along 1 margin; seeds about 1-14, longitudinal in the pod, beanlike, elliptical, flattened, blackish, 4 mm long; caruncle conspicuous; areole 3.5 x 2 mm.

The generic name ‘acacia’ comes from the Greek word ‘akis’, meaning a point or a barb.

The specific name is after A.R Mearns (1856-1916), an American army surgeon who collected the type specimen form a cultivated tree near Thika in Kenya. The name was first published in Pl. Bequaert in 1925.

BIOLOGY
A. mearnsii is a hermaphrodite and flowers profusely in the winter. Trees begin to yield fertile seed from the age of 5 years, giving good annual crops. The minute, fragrant flowers are self-fertile, but cross-pollination occurs. Bees are the main pollinators. Pods mature in 14 months, and gravity or propulsion from drying dehiscent pods initiates seed dispersal. In Nigrils, India, A. mearnsii flowers mainly in January-February and sporadically all year round; pods in April-May. In Australia, flowering takes place between October and December and fruits mature in 12-14 months.

The black wattle trees are alien invasive species in South Africa. (Nowell, D.C.)

Flowers at Polipoli, Maui, Hawaii (Forest and Kim Starr)

Newly invaded area at Polipoli, Maui, Hawaii (Forest and Kim Starr)

Acacia mearnsii De Wild.

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ECOLOGY
In Hawaii, A. mearnsii is a noxious weed and spreads prolifically between 600 and 1200 m in the 1000-1200 mm rainfall zones. A. mearnsii prefers a moderate climate, exhibiting great intolerance to extreme heat or cold. Its lower altitudinal range is decided by the fact that trees cannot stand high summer temperatures, and the upper altitudinal limit is based on the fact that the tree does not tolerate temperatures below 0 deg. C. Winter frosts and cold winds during the early part of the rainy season affect growth and survival rate, but older trees can withstand mild frost. Localities experiencing severe hailstorms and snowfall are unsuitable. Adequate soil moisture is a prerequisite for satisfactory growth. Trees cannot withstand drought because of their superficial root system and high rate of transpiration.

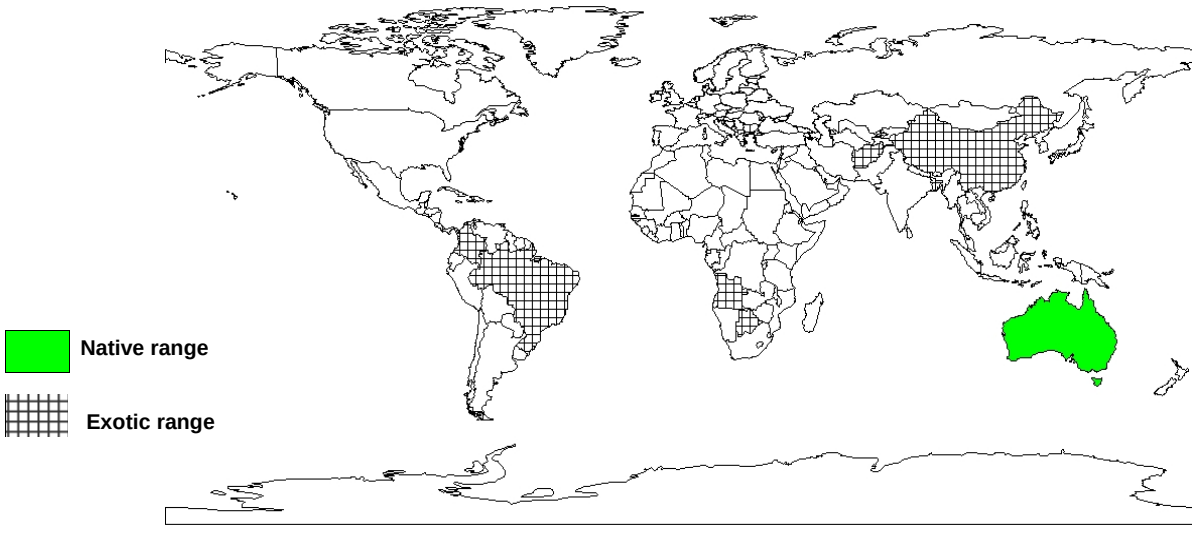
BIOPHYSICAL LIMITS
Altitude: 300-2 440 m, Mean annual temperature: 9-20 deg. C, Mean annual rainfall: 500-2 050 mm

Soil type: A. mearnsii flourishes in deep, well drained, light textured and moist soils. It thrives in well-aerated, neutral to acid soils, loamy soils, soils derived from shale or slate and is highly intolerant of alkaline and calcareous soils. Soils with lateritic pan close to the surface are most unsuitable.

DOCUMENTED SPECIES DISTRIBUTION

Native: Australia

Exotic: Afghanistan, Albania, Angola, Bangladesh, Bosnia and Herzegowina, Botswana, Brazil, Bulgaria, China, Colombia, Croatia, Eritrea, Ethiopia, France, Greece, Guatemala, Honduras, India, Indonesia, Iran, Italy, Japan, Kenya, Lesotho, Malawi, Malaysia, Mexico, Mozambique, Myanmar, Namibia, New Zealand, Nicaragua, Pakistan, Panama, Papua New Guinea, Portugal, Romania, South Africa, Spain, Sri Lanka, Swaziland, Tanzania, Thailand, Uganda, US, Vietnam, Zambia, 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: The leaves have a high protein content (about 15%). Palatability trials with sheep showed milled leaves to be unpalatable on their own and were acceptable only when mixed with other feedstock. In Hawaii, A. mearnsii has been fed to cattle during drought periods.

Apiculture: The extra floral nectaries of A. mearnsii (containing about 20% pollen protein and 40% sugar) and its late flowering makes the tree a suitable bee forage.

Fuel: Originally distributed as a source of tannin, black wattle is now recognized as a valuable fuel wood. Wood is moderately dense with specific gravity about 0.75, splits easily and burns well with a calorific value of 3500-4600 kcal/kg. The charcoal is extensively used in Brazil and Kenya, and in Indonesia the tree is extensively used as a domestic fuel and for curing tobacco.
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Fibre: The pulp productivity of A. mearnsii is about 320 kg/cubic m. Testing has shown that A. mearnsii yields a pulp with good strength characteristics and is suitable for wrapping paper and hardboard. It is also used for rayon.

Timber: The wood is moderately hard to hard, light yellowish to light red, heavy, durable, fairly tough and strong, with a specific gravity of 0.7-0.85; it is moderately easy to work and polishes well. It is used for house poles, mine props, tool handles, cabinet work, joinery, flooring, construction timber and matchwood.

Tannin or dyestuff: Wattle bark is the most widely used tannin material in the world. It contains 30-45% (dry basis) high-quality tannins that are used in tanning many classes of skins and hides for many different classes of leather. Such tannins are particularly effective on hard leathers for shoes and saddles. They give better color to leather than other tannins, do not precipitate in acid solution, and penetrate hides faster. A powdered bark extract is also used to prepare tannin formaldehyde adhesives for exterior grade plywood, particleboard and laminated timber.

SERVICES
Erosion control: Wattles grow well at high elevations even on slopes with shallow or poor acid soils that are unstable and will not support agricultural crops. They can therefore be very effective in preventing soil erosion. Densely packed plantations have proved effective in preventing further erosion, even on hillsides of up to 50 degrees slope.

Shade or shelter: The species has been planted as a shelterbelt, a firebelt and as a shade tree in plantations.

Nitrogen fixation: It is an effective nitrogen fixer and has an annual yield of wet leaves of 21-25 t/ha, containing 240-285 kg of nitrogen.

Soil improver: An efficient nitrogen-fixer and good source of green manure, it thus can restore and regenerate soils.

Ornamental: A. mearnsii is an attractive tree, flowering profusely in late winter.

Intercropping: In India, A. mearnsii is sometimes raised in taungya systems in conjunction with potato crops.

TREE MANAGEMENT
The trees have strong light requirements and respond to thinning in the early years. Growth rate is comparatively slow for the 1st 1 or 2 years. Thereafter, both height and diameter increments are rapid up to the age of 6-7 years, after which they fall off gradually. A. mearnsii has low coppicing power, discouraging people from propagating through coppicing. Protection of trees from fire is necessary, as fire may scorch the bark and reduce its value. A. mearnsii is easily killed by frost during the 1st 2-5 years of its life, although stands fertilized with super-phosphate are more resistant.

Harvesting 10-year-old trees results in the removal of large quantities of soil nutrients. Therefore, before planting, NPK fertilizers are added; application of lime has also been found to considerably increase yield. Taproot development largely depends upon the depth of the soil, but it has the general tendency to develop a superficial lateral root system. Because of this, trees are liable to being uprooted by strong gales during the monsoon season. Therefore windbelts of Eucalyptus globulus (blue gum) and Pinus patula could be planted at the periphery -- 5 rows of E. globulus alternating with 50 rows of A. mearnsii. Eucalyptus globulus may be planted 3 years before A. mearnsii. As the natural regeneration in clear-felled areas is very dense, thinning is done in the 3rd year. Trees are planted at spacing of 2.5-3.3 x 2.5-3.3. The optimum economic densities for the ages of 7, 9 and 11 years would be 1977-2224, 1483-1730 and 1236-1483 trees/ha, respectively.

GERMPLASM MANAGEMENT
Seed storage behaviour is orthodox. Viability is maintained for more than 2 years in hermitic storage at room temperature with 13 + or - 2% mc; 63% germination after 17 years open storage; no loss in viability following 17 years in bottle storage at room temperature; a few seeds survived 23 years in a herbarium; viability can be maintained for several years at 10 deg. C with 4.5-9% mc. There are about 66 000-88 000 seeds/kg.

PESTS AND DISEASES
Under wet conditions of more than 3000 mm annual rainfall, the trees are susceptible to insect attack and fungal diseases. A number of disease and insect pests have been identified in South Africa, notably damping-off, white grubs, grasshoppers and cutworms.
In Australia, the leaf-eating fireblight beetle (Pyrgoides orphana) is a serious pest. Loranthus termites and a number of other insects cause problems in Tanzania. In Brazil, heavy damage is caused by a beetle, which girdles twigs and branches.

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