Botanical name

Acacia saligna (Labill.) H.Wendl., Comment. Acac. 4, 26 (1820)

The botanical name is derived from the Latin *salignus* (willowy, willow-like) and refers to the habit of some plants where the phyllodes droop, as in some species of willow (*Salix*).

Common names

Golden Wreath Wattle, Orange Wattle, Port Jackson Willow (South African usage), and more; an aboriginal name is cujong according to Abbott (1983)

Characteristic features

Glabrous plants of variable habit, sometimes forming thickets due to root suckering. *Phyllodes* very variable in shape and size, long, normally largest at base of branches, prominently 1-nerved on each face; *pulvinus* well developed; *gland* prominent and disciform, situated 0-4 mm above the pulvinus. *Heads* globular, arranged in racemes and enclosed when very young by bracts, large, many-flowered, golden. *Pods* linear.

Description

Habit: Glabrous *shrubs* or *trees* 2-6(-10) m tall with the crowns 2-6(-12) m wide, sometimes forming thickets due to root suckering, very variable in growth form but in the Kalannie region natural stands of the species grow to narrowly obconic trees with sub-straight, ascending to erect trunks and main branches, crowns spreading, sub-open and with a somewhat untidy aspect, trunks dividing at 0.5-1.5 m above ground level.
Bark. Grey, smooth except slightly roughened at base of main trunks.
Branchlets. Normally slightly flexuose, sometimes +/- pendulous, pruinose or not.
Phyllodes. Very variable in shape and size, 7-25 cm long, (2-)4-20 mm wide, often larger (to 32 cm long and 50 mm wide) towards base of branches, widely spreading to pendulous, straight to falcate, green (glaucous in some other parts of its range); with 1 prominent *longitudinal nerve* on each face; *pulvinus* mostly 1-2 mm long, coarsely wrinkled; *gland* situated on upper margin of the phyllode 0-4 mm above the pulvinus, +/- disciform, 1-2 mm wide.
Heads. Mostly arranged in 2-10-branched racemes which are 3-30(-60) mm long and enclosed when very young by small, imbricate bracts, globular, mostly 12-13 mm in diameter when fresh (in the Kalannie region), golden, 25-75-flowered; *peduncles* 5-15(-25) mm long.
Flowers. 5-merous; *sepals* about 4/5-united.
Pods. Linear, flat, shallowly constricted between seeds, 5-14 cm long, 4-6 mm wide, thinly coriaceous.
Seeds. Longitudinal in the pods, 4-6 mm long, mostly 2.5-3 mm wide, shiny, dark brown to black; aril clavate, white.

Detailed treatments of this species are given in Maslin (1974), Fox (1995) and Doran and Turnbull (1997).

Taxonomy

In the past *A. saligna* had commonly been known under the name of *A. cyanophylla* (see Maslin 1974 for discussion).

Related species. At present it is not possible to ascertain with certainty the close relatives of *A. saligna*. There are, however, some indications that the species may

not be too far removed taxonomically from certain members of the *A. bivenosa* group (see Chapman and Maslin 1992 for revision of this group: the only member of this group occurring in the Kalannie region is *A. ligulata*). In the past *A. pycnantha* was commonly thought to be related to *A. saligna*, however, it is probable that they are not particularly close.

Variants. *Acacia saligna* is a very polymorphic species, particularly in regard to phyllode morphology and growth form. Much research is needed to understand and document this variation.

Distribution

Widespread and often locally abundant in southwest Western Australia where it extends from near Kalbarri on the Murchison River southeast to near Mount Ragged, east of Esperance; there are outlying populations about 200 km east-northeast of Kalbarri on Meka, Murgoo and Jingemarra Stations. The species is naturalised in temperate and sub-tropical eastern Australia and also around the Mediterranean Sea, in South Africa and in California.

Natural stands of *A. saligna* are rare in the Kalannie region.

Habitat

In its native area *A. saligna* is an adaptable species that is best developed on often calcareous sandy soils for the Swan Coastal Plain from Gingin to Busselton. Further inland, in the wheatbelt region, it is less common and is often confined to water courses or to soil aprons surrounding many of the large granite outcrops which occur in parts of this area. It occurs along saline drainage systems such as the human-induced salt-affected, upper catchment of the Avon River (e.g. east of Brookton) and the naturally saline Sanford River (north-east of Kalbarri). Details of the ecology of *A. saligna* is provided in Fox (1995).
Natural stands of this species are recorded from the following Kalannie region Land Management Unit. Shallow Soil over Granite.

Conservation status

Although natural stands of *A. saligna* are rare within the Kalannie region in the broader context this species is not considered rare or endangered.

Flowering

Over its rather wide geographic range *A. saligna* flowers from late July to October, with local conditions (perhaps the timing and/or incidence of rainfall being the most important) seemingly influencing the onset of flowering.

There is no information available on the flowering times of plants from the Kalannie region.

In cultivation this species flowers precociously, within 2-3 years of planting (Goor and Barney 1968)

Fruiting

Over the geographic range of this species pods with mature seeds have been collected from November to January.

Plants from the Kalannie region were with mature seed in mid-December 1996.

In southern Australia *A. saligna* sets moderately heavy seed crops in most years; in Cyprus its seed yield varies from 54-67 kg ha^{-1} for average plantations (Anon. 1955) up to 170 kg ha^{-1} (Michaelides 1979). The mature pods can be rapidly harvested manually, and the seeds readily detach from the mature pods. Viable seeds range from 28-79 000 per kg, but are typically 30-60 000 seeds per kg. According to Fox (1995) perhaps 80% of seed produced may be predated on the plants. For further details on seed production (and dispersal) see Fox (1995).

In cultivation this species sets profuse seed crops from about 6 years of age (Goor and Barney 1968).

Biological features

Longevity. The life span of this species is about 10-20 years (Whibley and Symon 1992).

Growth characteristics. A hardy, fast-growing species which, according to Fox (1995) is somewhat frost tender. See Fox (1995) for further details on growth characteristics. At least some forms of the species will coppice if cut at ground level and resprouts from the base following fire; plants under cultivation in the Kalannie region have been successfully pollarded.

Pests and diseases. A range of insect pests (including larvae of moths and butterflies, adults and larvae of beetles and weevils, and adults and/or nymphs of Cicadas, Plant Hoppers, Plant Lice, Scale Insects and Bugs) are reported by Van den Berg (1980a, 1980b and 1980c) from native Western Australian populations of *A. saligna*; the purpose of this study was to establish the importance of natural enemies with a view to biological control of *A. saligna* (and *A. cyclops*) in South Africa. This species is also very susceptible to infection by gall rust. See Fox (1995) for further details.

Rhizobia. Nakos (1977) found that the ability of this species to fix nitrogen was greatly reduced by drought, waterlogging, shading or defoliation.

Weed potential. Has the capacity to become weedy outside its natural habitat. In parts of South Africa A. saligna is a major environmental weed, having been introduced there around 1870 (Stirton 1978; for further references relating to the influence and ecology of this species in South Africa see Whibley and Symon 1992). It is also considered a weed problem in Spain and Portugal (De la Lama 1977, cited in Fox 1995). Densities of up to three million seedlings ha^{-1} occur nine months after fire in South Africa (Milton and Siegfried 1981).

Seed dispersal. Seeds of this species are dispersed by and ants (O'Dowd and Gill 1986).

Wood. The wood is described by Fahn (1959) as diffuse-porous with growth rings absent; anatomical details of wood structure are summarized by Fox (1995). Air dry density: 525 kg/m^3, based on 1 samples tested (G. Pronk, pers. comm.).

Propagation

Acacua saligna can be propagated from seed or cuttings (Elliot and Jones 1982). The seed requires a boiling or hot water treatment to break dormancy (see Fox 1995) for details of seed viability and germination techniques).

Raising seedlings in the nursery and field establishment presents few problems , however, protection of newly established plantations from grazing animals is essential. Direct seeding (750 g pre-treated seed /ha) has been used to establish plantations on better quality, well-cultivated soils in Cyprus (Michaelides 1979). In southwest Western Australia forage plantations of *A. saligna* have been established by mechanised direct seeding and more recently from bare rooted cuttings. At least some forms of the species regrow vigorously when pollarded at about 50 cm above

ground level. According to Hass (1993) irrigation can double height growth over the first 17 months from planting. Further details of growth performance of this species in pot and field trials is summarized in Fox (1995).

Acacia saligna grows very rapidly and has a broad edaphic range, including alkaline and moderately saline soils. Although it may be grown under light-moderate shade, plants prefer full sun and seed production will be maximised under such conditions. The plants respond well to light pruning and may coppice strongly, but are rather short-lived, typically 10-20 years. It may be possible to rejuvenate declining stands by coppicing and/or shallow ploughing to induce root-suckering. Michaelides (1979) has recommended a short rotation of 5-10 years duration, with regeneration by coppicing.

Acacia saligna plants may be damaged by a wide range of insect pests and diseases (see Pests and diseases above). Broad-scale cultivation of *A. saligna* in southern Australia can be expected to result in a build-up of one or more of these diseases to economic levels. Such anticipated problems may be minimised by establishing mixed and/or dispersed small-scale plantings, and by maintaining plants in a healthy condition, e.g. by planting at wide spacings on more difficult sites.

Revegetation

Acacia saligna is very variable in its growth form and displays a wide range of ecological tolerance. It has excellent potential for use in salinity and soil erosion control, as a windbreak, visual screen and for shade and shelter for both stock and wildlife.

Acacia saligna is commonly used in rehabilitation programs in south-west Western Australia and elsewhere (see Fox 1995). It is currently employed in the northern wheatbelt region of Western Austrlalia in direct seeding programs for regeneration purposes, including salinity control (P. Ryan, pers. comm.). Wilcox *et al*. (1996) recommend this species for revegetating a variety of soil types in the Midlands and northern wheatbelt regions of Western Australia; it is regarded by Clarke (1997) as being suited to revegetating drainage lines in these areas. This species is also recommended by Lefroy *et al.* (1991) for regeneration of “Grevillea” country (i.e. upland sandplain areas characterized by deep yellow, neutral to acidic sand over deep yellow sandy clay) in the central wheatbelt region.

Dispite the extensive use of *A. saligna* there is a need to better understand the nature of the variation within this species in order to better-facilitate its utilisation.

Utilisation

Salinity control. See Revegetation above.
Soil stabilisation. See Revegetation above. As summarized by Fox (1995) *A. saligna* has been used for sand dune stabilisation both within Australia and aboard.
Windbreak and visual screen. See Revegetation above.
Shade and shelter. The species is favoured in many countries abroad as a shade plant.
Fodder. This species would appear to have fairly good potential as a fodder plant. The protein content of its phyllodes is high, varying from 14-19 %, but digestibility is low. Nevertheless, there is evidence that when *A. saligna* is used as a stock feed in combination with other plants such as Tagasaste (*Chamaecytisus palmensis*) and/or perennial grasses, the sheep carrying capacity of land increases substantially. According to Lefroy *et al.* (1992) the advantage of using *A. saligna* is that it is easily established at relatively low cost, but a disadvantage is that the plants have to be cut regularly to make the foliage available to the animals. Overseas *A. saligna* is highly

valued as a stock fodder (El-Lakany 1987). For example, over 200 000 ha have been planted in north Africa as food for sheep and goats (Crompton 1991); however, the response of animals to grazing *A. saligna* is variable, depending upon breed. For example, based on work in South Africa, it appears that some breeds of sheep have a greater ability to digest *A. saligna* than others, possibly due to differences in gut flora (Lefroy, pers. comm.). Also, under trial conditions in Cyprus goats lost weight when fed on *A. saligna* only (Fox 1995). Crushed seeds of this species have been fed to a concentration of 95% total ration to sheep without ill effects, but results with poultry were not encouraging (Anon. 1955).

Wood. The wood may be used for fuelwood or charcoal, and has even been successfully converted into particle board in Tunisia (El-Lakany 1987). Annual wood production (assessed overbark) varies between 1.5 -10 m^3 ha^{-1} (Michaelides 1979). According to Sale (1948: cited in Fox 1995) a firewood harvest can be taken from dune planting of this species at 10-15 years. It is likely that many other species of Acacia would produce a better-quality fuelwood than *A. saligna.*

Horticulture and amenity plantings. Widely cultivated (both within Australia and abroad) as an ornamental for use in park plantings, gardens and on farms

Seed for human food. *Acacia saligna* is one of the promising species suggested by Maslin *et al.* (1998) for trialling in southern Australia as a source of seed for human food. However, it is emphasised that much more research is needed before this species can be recommended for food production; in particular, there is a need for comprehensive biochemical analyses to ascertain if any anti-nutritional or toxic components are present in the seeds. Nevertheless, the seeds of *A. saligna* had reportedly been consumed by Aborigines (Cherikoff and Isaacs 1989; P. Bindon pers. comm.); they were probably made into flour and eaten with pounded root bark from various eucalypts (Bindon, pers. comm.). Whilst the seeds are reportedly free of cyanogenic glycosides (Michaelides 1979), they contain protease inhibitors (Kortt 1985), however, such compounds are common to many grain legumes and can be deactivated by heat treatment/cooking.

Tannin products. *Acacia saligna* was at one time the principal source of tan bark in southwest Western Australia, with a yield of nearly 30% tannins (Maiden 1889). It was also previously a major source of tannin in South Africa before being replaced by superior tanbarks (of *A. mearnsii*) (Boucher and Stirton 1980).

Miscellaneous. Physiological stress or mechanical damage to the bark may induce copious gum flows: the acid-stable gum may have use in certain foodstuffs (Michaelides 1979). An analysis of the gum has been provided by Charlson *et al.* (1955) and Kaplan and Stephen (1967, cited in Anderson and Bell 1976).

The phyllodes of *A. saligna* can be used to dye wool to a lemon yellow colour using an alum mordant (Martin 1974).

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