Acacia longifolia

Scientific Name

***Acacia longifolia* (Andrews) Willd.**

Synonyms

Acacia longifolia (Andrews) Willd. var. *typica* Benth., *Mimosa longifolia* Andrews, *Mimosa macrostachya* Poir., *Phyllodoce longifolia* (Andrews) Link. *Racosperma longifolium* (Andrews) C. Mart

Family

Fabaceae, also placed in Mimosaceae

Common/English Names

Acacia Trinervis, Aroma Doble, Golden Wattle, Coast Wattle, Sallow Wattle and Sydney Golden Wattle Golden Wattle, Long-Leaved Wattle, Sallow Wattle, Sydney Golden Wattle

Vernacular Names

None recorded

Origin/Distribution

The species is indigenous to native to south-eastern Australia, from the extreme southeast of Queensland, eastern New South Wales, eastern and southern Victoria. It is now widely cultivated in subtropical areas globally.

Agroecology

In its native range, it is found in heath and sclerophyll forest and on coastal headlands, sand dunes, riparian habitats and adjacent alluvial flats up to 150 m.

Edible Plant Parts and Uses

Flowers are edible, cooked or eaten in fritters (Cribb and Cribb 1976).

Acacia species used by the bushfood industry in Australia for the edible wattle seeds, ground seed products and occasionally flowers include *A. longifolia* var. *sophorae* (elegant wattle, coast wattle) (Plate 3) (Hegarty et al. 2001). Well-roasted, high-quality wattleseed will have a coffee, chocolate and hazelnut characteristics (Cherikoff 2011). Typical uses of wattleseed include ground, extract and paste (Cherikoff

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2011). Ground wattle seeds are used in pancake batter, desserts (mousse, creme brulee, anglaise) and baked products e.g. muffins, breads and shortbread. Wattle seed extracts are added to sweet or savoury sauces, dairy desserts and as a coffee substitute.

Botany

A spreading and unarmed shrub or small tree, 2–7 m tall, with a smooth or shallowly fissured, greyish bark; branchlets angled towards the tips and with bright green, phyllodes instead of leaves. Phyllodes simple, flat, glabrous, linear-lanceolate to oblanceolate, 8–20 cm long by 1–2.5 cm wide, with 2–5 prominent longitudinal veins. Inflorescence, 1 or 2 in axil of phyllodes. Flowers yellow in a cylindrical brush like flower heads, 2–5 cm by 7 mm. Fruit 5–15 cm by 3-6 mm, straight to slightly twisted, cylindrical, constricted between seeds with a curved beak, green turning brown, containing 6–8 longitudinal seeds, each with funicle folded into a large aril (Plates 1 and 2).

Nutritive/Medicinal Properties

The following flavonoids were identified in the flowers: naringenin and 5-β-D-glycosyl-naringenin (Kerber and Silva 1993), naringenin (0.018 %w/w), a flavonone, and two of its glycosides, naringenin-5-β-D-galactoside (0.582 % w/w) and naringenin-5-β-D-glucoside (0.2 % w/w) (da Silvia and Keber 2003). An aurone, identified as auteusidin-4-galactoside, was isolated from the ethanol extract of the flowers (Peitz and Keber 2003). *Acacia longifolia* seeds were found to contain 6–10 % water content, 12–13 % dwb protein and 19–20 % dwb in the embryo (Murray et al. 1978). The globulin protein designated G6, of molecular weight c. 250,000, comprised subunits of molecular weight 72,000, 61,000, 45,000, 36,000, 31,000, 16,000 and 11,000.

Small amounts of phenethylamine were found in the leaf, stem and flower (White 1944a, b, 1951). Flower spikes had minor alkaloid (White 1957), tryptamine itself found in some flowers (White 1951). *N*-*N*-Dimethyltryptamine (DMT) 0.2–0.3 % and histamine were also identified in *A. longifolia* (Hegnauer 1994).

Leaf, bark and pod extracts of *Acacia longifolia* yielded two major histamine alkaloids:

Plate 2 Close up of brush-like flower heads

Plate 1 Leaves and flower heads

Plate 3 Tree label

N-(2-imidazol-4-yl-ethyl)-*trans*-cinnamamide and *N*-(2-imidazol-4-yl-ethyl)-deca-*trans*-2, *cis*-4-dienamide in variable amounts and trace amounts in the seeds (Repke 1975). The lipidic fraction extracts of the *Acacia longifolia* wood and bark were found to contain fatty acids, fatty alcohols (minor component), sterols, steryl glucosides and steryl esters (Freire et al. 2005). The fatty acids were mainly 16:0, palmitic acid; 18:2, linoleic acid; 18:1, oleic acid; and 18:0, stearic acid. The sterols were predominantly Δ^7 sterols (spinasterol and dihydrospinasterol) and Δ^5 sterols (stigmasterol and β-sitosterol); other free sterols were campesterol, stigmastanol and β-sitostanol as minor components. The steryl glucosides found were spinasteryl glucoside, β-sitosteryl glucoside and dihydrospinasteryl glucoside in the wood and bark; and campesteryl glucoside and stigmasteryl glucoside in the wood.

Antimicrobial Activity

The ethanol leaf extract (1,000 mg), its ethyl acetate fraction and hydroethanol fractions exhibited antibacterial activity against *Staphylococcus aureus*; and moderate growth inhibitory activity against *Fusarium oxysporum* and *Cylindrocladium spathulatum* (Peitz and Keber 2003). The crude ethanol leaf extract, the ethyl acetate and the remaining ethanol fractions showed growth inhibition of *Staphylococcus aureus*, and only the crude ethanol extract showed moderate growth inhibition of *Pseudomonas aeruginosa* and did not inhibit growth of *Escherichia coli* (Peitz et al. 2003). Phytochemical screening indicated the presence of tannins, leucoanthocianidins, flavonoids and triterpene/steroids.

Anticancer Activity

In-vitro studies showed that spinasterol had antitumorigenic potential (Villaseñor and Domingo 2000). Using the mouse skin tumour assay, spinasterol at a concentration of 15 ug/0.2 ml acetone decreased the incidence of skin tumours by 55.6 % and decreased the number of tumours by 65.0 % when applied immediately after croton oil.

Antidiabetic Nephropathy Activity

Studies found spinasterol to have considerable therapeutic potential in modulating the development and/or progression of diabetic nephropathy (Jeong et al. 2004). Spinasterol was found to be a potent inhibitor ($IC_{50} = 3.9 \times 10^{-12}$ g/ml, 9.5 pmol/l) of glomerular mesangial cell proliferation caused by high-ambient glucose, and its inhibitory potency was about 1,000 times higher than that of simvastatin, an HMG-CoA reductase inhibitor used as a positive control. Spinasterol also significantly reduced the increases of serum triglycerides, renal weight and urinary protein excretion in streptozotocin-induced diabetic mice.

Hypocholesterolaemic Activity

Animal studies showed that spinasterol, as well as sitosterol, inhibited cholesterol absorption, resulting in decreases of the plasma and liver cholesterol levels (Uchida et al. 1983). Further, when cholesterol absorption was inhibited, the synthesis of bile acids, especially that of chenodeoxycholic acid, decreased, suggesting that the dietary cholesterol was preferentially metabolized to chenodeoxycholic acid in mice.

Allergy Problem

Pollens are important triggers for allergic asthma and seasonal rhinitis (Hassim et al. 1998; Widmer et al. 2000). Studies showed that *Acacia longifolia* pollens released proteases that were able to cause detachment of murine airway epithelial cells from their substratum in-vitro and may not be effectively inhibited by endogenous antiproteases (Hassim et al. 1998). The intrinsic protease activity of *Acacia* pollen allergens may contribute to sensitization by disrupting the integrity of the airway epithelial barrier. In another study, *Acacia longifolia* pollen diffusate was found to release proteases that exhibited high rates of cleavage of arginine and lysine substrates (Widmer et al. 2000). Disruption of epithelial integrity by proteases released following deposition of pollens on mucosal surfaces could promote sensitization and induce inflammation.

Psychopharmacological Activity

N,*N*-Dimethyltryptamine (DMT) is a psychedelic, hallucinogen compound. In a double-blind, saline placebo-controlled, randomized design study, intravenous administration of dimethyltryptamine (DMT) dose-dependently elevated blood pressure, heart rate, pupil diameter and rectal temperature, in addition to elevating blood concentrations of beta-endorphin, corticotropin, cortisol and prolactin in experienced hallucinogen users (Strassman and Qualls 1994). Growth hormone blood levels rose equally in response to all doses of DMT, and melatonin levels were unaffected. Threshold doses for significant effects relative to placebo were also hallucinogenic (0.2 mg/kg and higher). Subjects with five or more exposures to 3,4-methylenedioxymetha mphetamine demonstrated less robust pupil diameter effects than those with two or fewer exposures. In another randomized, double-blind, design study of experienced hallucinogen users, tolerance to 'psychedelic' subjective effects did not occur according to either clinical interview or Hallucinogen Rating Scale scores (Strassman et al. 1996). Adrenocorticotropic hormone (ACTH), prolactin, cortisol and heart rate responses decreased with repeated DMT administration, although blood pressure did not. The data demonstrated the unique properties of DMT relative to other hallucinogens and underscore the differential regulation of the multiple processes mediating the effects of DMT.

Other Uses

The plant is employed to prevent soil erosion and is useful in securing uninhabited sand in coastal areas. The tree's bark has limited use in tanning, primarily for sheepskin. Leaves have been used as fish poison. The green unripe seeds were used as a substitute for soap. The flowers have fungicidal activity. The ethyl acetate fraction (500 ppm) of the ethanol flower extract showed a remarkable antifungal activity, inhibiting growth of *Rhizoctoni*a sp. by 30 %, *Colletotrichum acutatum* by 15.9 % and *Fusarium oxysporum* by 10.4 % (da Silvia and Keber 2003).

Allelopathic Activity

The chloroform fraction obtained from the flower ethanol extract exhibited allelopathic activity; it inhibited markedly the germination of *Lactuca sativa* seeds and growth of the radicle and hypocotyl (Peitz and Keber 2003).

Comments

Two subspecies of *Acacia longifolia* have been recognized: *Acacia longifolia* subsp. *longifolia* and *Acacia longifolia* subsp. *sophorae* (Labill.) Court.

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