

# Medicinal Plant Images



**Figure 1:** *Macrozamia douglasii* (Family Zamiaceae): Cycad is the common name for plants of the order Cycadales, which includes the families Cycadaceae, Stangeriaceae and Zamiaceae. Some cycads had uses as traditional Australian Aboriginal medicines, with the seeds being used as antiseptic agents.<sup>[1]</sup> However, care must be taken when using this plant as it is known to be toxic. Indigenous Australians traditionally ground and soaked the seeds before use, to remove the toxin. This photograph was taken on Frazer Island, Australia by Dr Ian Cock.

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1. Cock IE, Medicinal and aromatic plants – Australia. In Ethnopharmacology, Encyclopedia of Life Support Systems (EOLSS), 2011, Developed under the auspices of UNESCO, EOLSS Publishers, Oxford, UK [<http://www.eolss.net>].



**Figure 2:** *Rubus caesius* L. (the photo was taken by Adam Sikora in July 2012).

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## INTRODUCTION

The genus *Rubus* comprises around 700 species, naturally occurring in temperate climates.<sup>[1,2]</sup> Some of them are cultivated in numerous varieties as industrial plants for the quality of nutritious and tasty fruits. *Rubus caesius* is a well-known shrub belonging to *Rosaceae* family. It is also commonly known as dewberry, blackberry or bramble. It is native member of flora extending from Europe to Siberia, but it can be successfully found in the north-central United States. There is a possibility that the plant occurs in other places due to the fact that it is cold-resistant and can stabilize erosion-susceptible places.<sup>[3]</sup> *R. caesius* is often found in the forest as one of compounds

creating undergrowth, as well as in the thickets, on the wastelands or the roadsides. It has been widely cultivated in gardens. Generally, it is wild growing plant requiring an alkaline soils, rich in nitrogen.

## BOTANICAL DESCRIPTION

Its height reaches from 0.5 to 2 metres. Canes are trailing or slightly upright. Primocanes are rounded, white-glaucous, rarely hairy, frequently glabrous with short, straight or falcate prickles. Canes are green or, if exposed to the sun, have a tinge of red. The leaf consists of three leaflets, slightly and bilaterally hairy. The leaflet at the top

is oval, generally has three lobes, but sometimes can have more or less than just three. It is shortly acuminate. Lateral leaflets have an oval-rhombic shape. Stipules are ovate or lanceolate. The inflorescences are corymbose. The larger inflorescences consist of short terminal corymb. It is subtended by similar corymbs which have a complex and peniculate form. The inflorescences are composed of two to five flowers. Large flowers have long pedicels with five sepals. The sepals are grey-green, tomentose and have an oval-lanceolate shape, they are shortly acuminate. Sepals are appressed to the flourishing fruit. Inside the flowers there are many stamens and pistils. White petals are large, ovate with indentation at the top.<sup>[3,4]</sup> The fruit of *R. caesius* consists of not more than 20 drupelets. Drupelets are covered by blue cuticula and cannot separate from their fleshy receptacles readily. Each drupelet has one hard seed inside. The single drupelet is composed of three layers: external: thin exocarp, medium: fleshy mesocarp and internal: hard endocarp. Endocarp is also known as pyrene. The structure of the endocarp is typical to particular plant species. The pyrene of *R. caesius* is created by two layers of elongated, thick-walled sclereids. The surface of the endocarp consists of many shallow hollows. The flat bottoms of shallow hollows can be easily observed, whereas the narrow bottoms of deep hollows are not so clearly visible. Transition cells in the endocarp show features intermediate between parenchyma cells and sclereids. Perforations are uniform and are composed in a very unique pattern.<sup>[5]</sup> Seeds are rather heavy (0.37g) and hard (according to the Hardness Scale, they have number 3). The seed coat is composed of three layers: exotesta, mesotesta and internal endotesta. Exotesta is created by 2 to 5 layers of cells. Mesotesta contains macrosclereids, which vary in shape. The macrosclereids of endotesta are globular and uniform in diameter.<sup>[6]</sup>

## PHYTOCONSTITUENTS

Both, aerial and underground parts of *R. caesius* are valuable source of chemical constituents. Previous phytochemical studies have proved the presence of structural and biogenetical diverse of secondary metabolites.<sup>[7]</sup> Chemical composition of seeds of *R. caesius* has already been described. The content of the proanthocyanidins (PA) is varied and ranges up to 1.25 µg per seed. One of the basic tasks of the PAs is to inhibit fluids and gases exchange between seed and external environment. It is very beneficial, because it protects the plant from germination and growing in unfavorable environmental conditions. Seeds remain in dormancy until the conditions change. Wada *et al.* also concluded that PA analysis indicated a

widerange of concentrations of PA in the *Rubus* seeds, with two to five times as much in the harder, thicker seeds compared to the softer, thinner seeds. These PAs are likely involved in both physical and physiological dormancy mechanisms of *Rubus* species.<sup>[6]</sup> Phytochemical investigation of the juice obtained from fruits was also undertaken. The presence of phenolic compounds, such as flavonoids and anthocyanins was reported. Studies have also shown a high degree of correlation between phenolic content and antioxidant properties.<sup>[8,9,10]</sup> Other study, which was carried out with *R. caesius* leaves, have shown the presence of ellagic acid, flavonoids (derivatives of quercetin and kaempferol) as well as tannins.<sup>[11]</sup> More recently, the characterization of honey from *R. caesius* has resulted in the identification of many ingredients, mainly: carbohydrates, polyphenolics (flavonoids: chrysin, galangin, pinocembrin, kaempferol, tectochrysin), phenolic acids (caffeic, *p*-coumaric and ellagic acids), organic acids, aminoacids, proteins, minerals, vitamins and lipids. This honey is one of the most important unifloral honey, which colour is described as amber. It's intensity depends on carotenoids' and flavonoids' amount.<sup>[12]</sup>

## PHARMACOLOGICAL ACTIVITY

Dewberry is valuable plant, which is used, not only in preventing and treating diseases, but also in the food industry. The plant is known from its antioxidant activity, which is correlated with presence of polyphenolics. Phenolic compounds inhibit creating free radicals, which are main factors causing oxidative stress.<sup>[13]</sup> People remaining on diet rich in polyphenolics are in group of minor risk of coronary heart disease and tumors. Polyphenols present in *R. caesius* can inhibit NO, which is a mediator of pathological reactions, such as exacerbation of inflammation. Its high amount leads to carcinogenesis.<sup>[14]</sup> Tas and co-authors reported using *R. caesius*, in complementary and alternative medicine (CAM), in treatment of breast, prostate and ovarian cancers, in Turkish oncology patients. The CAM is a kind of therapy, which is not included in the conventional methods, but is one of the effective therapies in the treatment of cancer.<sup>[15]</sup>

Gulec *et al.* demonstrated that herbal remedies, including dewberry, used for the treatment of hemorrhoid in Turkey, contain vasoactive and especially vasoconstrictor ions. Hemorrhoids are nowadays common disease, which is manifested by rectal hemorrhagia, discomfort and pain. Stress, irregular eating, constipation and chronic lack of time are the reason why more and more people suffer from hemorrhoids. There are two types of ions: vasodilator and



vasoconstrictor. It is probable that the vasoconstrictor ion contents could contribute to the curative effects of aerial parts of *R. caesius* in the treatment of hemorrhoids.<sup>[16]</sup>

Honey produced from *R. caesius* nectar is not only tasty, but also healthy. It is very effective in healing gastric disorders. Moreover, it has an anti-inflammatory effect and protect mucous membrane of throat and oral cavity. The antimicrobial activity of the honey against several pathogens and its dependence on the floral origin has also been reported.<sup>[12]</sup> Observations show antibacterial activity against rather resistant bacteria, such as *Proteus mirabilis*, *Bacillus cereus*, *Staphylococcus aureus* and *S. epidermidis*.<sup>[17]</sup>

Folk medicine attributes many virtues to the *R. caesius*. However, further studies are required to confirm the pharmacological relevance of the findings, but now there are great hopes for its wide therapeutical application.

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