

A FACTT Contribution to Your Mental Welfare During Your Home-stay

About once a week the FACTT newsletter editor will send you a short piece about a family, genus or species of some interest. It is hoped that it will prompt you to look more closely at the topic using the internet and thereby help you if you are a little discombobulated during these difficult times. For example, Georgius E. Rumphius is an interesting and little known character. Similarly L.A.S. Johnson (1925-1997) and K.L. Wilson (1950) deserve wider recognition for their taxonomic work. I have not included references as this is intended to be a knocked out piece for the times.

This first article is about the genus Casuarinaceae. We are all familiar with one of the species in this family *Casuarina cunninghamiana* which grows naturally on the banks of the Cotter River and has been extensively planted in the urban areas of the ACT. But there is far more to this family than one may first imagine.

The family is characterised by having foliage which was said to resemble the plumage of the cassowary bird Gregorius Rumphius in the 1650s. He was a German born botanist employed by the East India Company in Ambon, Indonesia. The name "casuarina" was then adopted by Linnaeus.

The Casuarinaceae is a family of 96 species with distinctive features which set them apart from all others. The leaves are reduced to small teeth on a photosynthetic branchlet which can easily be pulled apart. They also have cones. Individual species are either monoecious or dioecious with some a bit of both although the majority are dioecious.

The male flowers are small and simple with only one stamen. The female flowers occur in clusters and form the cone. They are pollinated by the wind and maybe small insects.

They are found in the fossil record in Gondwanaland and a few people claim evidence from Laurasia. As with all organisms the

geological changes over time have caused changes and adaptations in the species reflecting the changing climate and physical separation resulting from continental drift. The evidence for the fossil distribution was reviewed by Johnson and Wilson in 1989.

Today the family is represented in Australia, the Pacific Islands, and Southeast Asia.

Some species are small bushes such as *Allocasuarina nana* while others are reasonable size trees such as *Casuarina cunninghamiana*. The most important plantation species are in the genus *Casuarina*.

The roots have nitrogen fixing nodules containing the actinomycete *Frankia*. This is a very important feature as it allows the trees to succeed on poor soils. The symbiotic relationship has a dramatic effect on the growth of the tree. Mycorrhizas on the roots are an important and interesting topic which will be covered in one of these notes in the future.

Few of the species have all the characteristics required for large scale planting unlike some of the eucalypts so research into domestication for large scale wood production has been limited. Most-utilised species are harvested for local use with the exception of *C. equisetifolia* and *C. junghuhniana* which are extensively planted in some tropical countries. The use of species for soil stabilisation and small-scale wood production for firewood does not demand the kind of research which has gone into some of the eucalypts and particularly some of the pines for wood production. *C. equisetifolia* is an exception to this. It is widely grown in the tropics for a range of uses and has been a focus of international meetings on casuarinas.

International interest in the family was started in 1980 when Max Day (CSIRO) was asked to propose a project for forestry for Third World countries emphasising trees for firewood, soil protection, and fodder production. His suggestion of casuarinas was taken up and resulted in the work carried out since that time. There have been regular international conferences since 1981 the most recent

in 2019 in Krabi Thailand which focused on *C. equisetifolia* and *C. junghuhiana* and its hybrid. This is because between 70-80% of casuarina plantings in India will be these two species.

In 1982 L.A.S. Johnson and K. L. Wilson working at the Royal Botanic Gardens Sydney split the family into four genera namely.

Casuarina, Malay kasuari

Allocasuarina, Allo Gr. other:

Gymnostoma, Gymno L. naked and stoma for mouth referring to the exposed stomata on the branchlets;

Ceuthostoma, Ceu Gr. keuthos for hidden and stoma referring to the concealed position of the stomata.

The last two most of us would be hard pressed to recognise I expect. Initially this splitting of the Casuarinaceae into four genera was not readily taken up but is now widely accepted.

The *Gymnostoma* is a genus of 18 species ranging from shrubs to trees in tropical regions including Malaysia, Fiji, New Caledonia. *Gymnostoma australianum* occurs in the Daintree region of Australia. Young specimens can be seen in the Rain Forest Gully at the National Botanic Gardens.

Ceuthostoma was formerly included in the genus *Gymnostoma*, the two identified species *C. palawanense* and *C. terminale* occur only in Malaysia.

The 59 species of *Allocasuarina* are endemic to Australia. The genus is usually found on soils with low nutrient status. Examples are the desert oak (*A. decaisneana*) in Central Australia and the stringybark she-oak (*A. inophloia*) on the nutrient-poor sandstone ranges of inland Queensland. This tolerance of harsh conditions gives some of the species the potential for planting in other countries for a wide range of purposes.

The *Casuarina* genus of 17 species occurs in Australia, Indonesia, Malaysia and the Pacific Islands, generally on more fertile sites.

The most extensively planted species is *C. equisetifolia* with large areas in China and India for the stabilising of sand dunes and as a source of pulp and timber.

The Casuarinaceae is an interesting family within which are some useful species which deserve more attention locally than they receive these days. For example the use of *C. cunninghamiana* and the potential of hybrids with species such as *C. glauca*; and provenance variation in *C. cunninghamiana* to better suit urban requirements. Also, some of the more specialised *Allocasuarina* species may find a use in the changing climate and, dare one suggest, exploiting their renowned firewood properties for bioenergy. Unfortunately, there seems to be no capacity to do such work left in Canberra either at the Federal or Territory level.

I would like to thank John Turnbull, Stephen Midgley, and Khongsak Pinyosarerk for their help but of course all errors are mine not theirs.

I hope you use the net to look more closely at some of the names here.

Steve Thomas

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