

= *Ficus rubiginosa* =

Ficus rubiginosa, commonly known as the rusty- or Port Jackson fig (*damun* in the Dharug language) is a species of flowering plant native to eastern Australia in the genus *Ficus*. Beginning as a seedling that grows on other plants (*hemiepiphyte*) or rocks (*lithophyte*), *F. rubiginosa* matures into a tree 30 m (100 ft) high and nearly as wide with a yellow @-@ brown buttressed trunk . The leaves are oval and glossy green and measure from 4 to 19 @. @ 3 cm (1 1 ? 2 ? 7 1 ? 2 in) long and 1 @. @ 25 to 13 @. @ 2 cm (1 ? 2 ? 5 1 ? 4 in) wide .

The fruits are small , round and yellow , and can ripen and turn red at any time of year , peaking in spring and summer . The fruit is known as a *syconium* , an inverted inflorescence with the flowers lining an internal cavity . *F. rubiginosa* is exclusively pollinated by the fig wasp species *Pleistodontes imperialis* , which may in fact comprise four cryptospecies . The *syconia* are also home to another fourteen species of wasp , some of which induce galls while others parasitise the pollinator wasps , and at least two species of nematode . Many species of bird , including pigeons , parrots and various passerines , eat the fruit . Ranging along the Australian east coast from Queensland to Bega in southern New South Wales , *F. rubiginosa* grows in rainforest margins and rocky outcrops. it is used as a shade tree in parks and public spaces , and when potted is well @-@ suited for use as an indoor plant or in *bonsai* .

= = Taxonomy = =

Ficus rubiginosa was described by French botanist René Louiche Desfontaines in 1804 , from a type specimen whose locality is documented as " New Holland " . In searching for the type specimen , Australian botanist Dale Dixon found one from the herbarium of Desfontaines at Florence Herbarium and one from the herbarium of Étienne Pierre Ventenat at Geneva . As Ventenat had used Desfontaines ' name , Dixon selected the Florence specimen to be the type in 2001 . The specific epithet *rubiginosa* related to the rusty coloration of the undersides of the leaves . Indeed , rusty fig is an alternate common name ; others include Illawarra fig and Port Jackson fig . It was known as *damun* (pron . " tam @-@ mun ") to the Eora and Darug inhabitants of the Sydney basin .

In 1806 , German botanist Carl Ludwig Willdenow gave it the botanical name *Ficus australis* in *Species Plantarum* , but this is a *nomen illegitimum* as the species already had a validly published name . Italian botanist Guglielmo Gasparrini broke up the genus *Ficus* in 1844 , placing the species in the genus *Urostigma* as *U. rubiginosum* . In 1862 , Dutch botanist Friedrich Anton Wilhelm Miquel described *Urostigma leichhardtii* from material collected from Cape Cleveland , Queensland , noting it had affinities to *F. rubiginosa* . In 1867 , he placed *Urostigma* as a subgenus in the reunited *Ficus* , which resulted in the taxon becoming *Ficus leichhardtii* . Miquel also described *Ficus leichhardtii* variety *angustata* from Whitsunday Island , later classified as *F. shirleyana* by Czech botanist Karel Domin . Queensland state botanist Frederick Manson Bailey described *Ficus macrophylla* variety *pubescens* in 1911 from Queensland , Domin later renaming it *Ficus baileyana* . All these taxa were found to be indistinguishable from (and hence reclassified as) *F. rubiginosa* by Dixon in 2001 .

In a study published in 2008 , Nina Rønsted and colleagues analysed the DNA sequences from the nuclear ribosomal internal and external transcribed spacers , and the glyceraldehyde @-@ 3 @-@ phosphate dehydrogenase region , in the first molecular analysis of the section *Malvanthera* . They found *F. rubiginosa* to be most closely related to the rainforest species *F. watkinsiana* and two rock @-@ growing (*lithophytic*) species of arid northern Australia (*F. atricha* and *F. brachypoda*) . They classified these species in a new series *Rubiginosae* in the subsection *Platypodeae* . Relationships are unclear and it is uncertain into which direction the group radiated (into rainforest or into arid Australia) .

Joseph Maiden described variety *lucida* in 1902 , and Bailey described variety *glabrescens* in 1913 . Both had diagnosed their varieties on the basis of their hairlessness . Maiden described a taxon totally devoid of hair , while Bailey described his as nearly glabrous (*hairless*) . As Bailey 's description more closely matched Dixon 's findings (that these variants were only partly and not

completely hairless) , Dixon retained Bailey 's name and reclassified it as *Ficus rubiginosa* forma *glabrescens* in 2001 as it differed only in the lack of hairs on new growth from the nominate form .

= = Description = =

A spreading , densely @-@ shading tree when mature , *F. rubiginosa* may reach 30 m (100 ft) or more in height , although it rarely exceeds 10 m (30 ft) in the Sydney region . The trunk is buttressed and can reach 1 @.@ 5 m (4 ft 11 in) in diameter . The bark is yellow @-@ brown . It can also grow as on other plants as a hemiepiphyte , or 1 ? 5 m (3 ? 16 ft) high lithophyte . Alternately arranged on the stems , the ovate (egg @-@ shaped) , obovate (reverse egg @-@ shaped) or oval @-@ shaped leaves are anywhere from 4 ? 19 @.@ 3 cm (1 5 ? 8 ? 7 5 ? 8 in) long and 1 @.@ 25 ? 13 @.@ 2 cm (1 ? 2 ? 5 1 ? 4 in) wide , on 7 ? 8 @.@ 2 cm (2 3 ? 4 ? 3 1 ? 4 in) -long petioles (stalks that join the leaves to stems) . They are smooth or bear tiny rusty hairs . There are 16 to 62 pairs of lateral veins that run off the midvein at an angle of 41 @.@ 5 ? 84 @.@ 0 ° , while distinct basal veins run off the midvein at an angle of 18 @.@ 5 ? 78 @.@ 9 ° . As with all figs , the fruit (fig) is actually an inverted inflorescence (compound flower) known as a syconium , with tiny flowers arising from the fig 's inner surface into a hollow cavity . *F. rubiginosa* is monoecious ? both male and female flowers are found on the same plant , and in fact in the same fruit , although they mature at different times . Often growing in pairs , the figs are yellow initially and measure 4 ? 10 mm (1 ? 8 ? 3 ? 8 in) across . Ripening to red in colour , they are tipped with a small nipple and on a 2 ? 5 mm (1 ? 8 ? 1 ? 4 in) stalk . Fruits ripen throughout the year , although more so in spring and summer . Some trees have ripe and unripe fruit at the same time .

It closely resembles its relative , the Moreton Bay fig (*F. macrophylla*) . Having similar ranges in the wild , they are often confused . The smaller leaves , shorter fruit stalks , and rusty colour of the undersides of the leaves of *F. rubiginosa* are the easiest distinguishing features . It is also confused with the small @-@ leaved fig (*F. obliqua*) , the syconia of which are smaller , measuring 4 ? 12 mm long and 4 ? 11 mm in diameter , compared with 7 ? 17 mm long and 8 ? 17 mm diameter for *F. rubiginosa* .

= = Distribution and habitat = =

Ficus rubiginosa occurs from the top of the Cape York Peninsula in north Queensland southwards along the eastern coastline of Australia to the vicinity of Bega on the south coast of New South Wales . The range extends westwards to Porcupine Gorge National Park in Queensland and the far western plains in New South Wales . *F. rubiginosa* f. *rubiginosa* and *F. rubiginosa* f. *glabrescens* are found over most of the range , though the latter does not occur south past the New South Wales @-@ Queensland border region . Lithophytic , hemiepiphytic and tree forms can be found together in local populations of plants .

F. rubiginosa is found in rainforest , rainforest margins , gullies , riverbank habitat , vine thickets , and rocky hillsides . It is found on limestone outcrops in Kanangra @-@ Boyd National Park . Fig seedlings often grow from cracks in stone where seeds have been lodged , in locations such as cliffs and rock faces in natural environments , or in brickwork on buildings and elsewhere in the urban environment . The soils it grows on are often well @-@ drained and low in nutrients . They are derived from sandstone , quartzite and basalt . In the Sydney region , *F. rubiginosa* grows from sea level to 1000 m (3500 ft) altitude , in areas with an average yearly rainfall of 600 ? 1 @.@ 400 mm (24 ? 55 in) . *F. rubiginosa* is largely sympatric with *F. obliqua* , though its range extends further west into dryer regions than the latter species .

Outside its native range , *F. rubiginosa* has naturalised to some degree in urban Melbourne and Adelaide in Australia , as well as New Zealand , Hawaii and California , and Mediterranean Europe . *F. rubiginosa* has been planted widely in Malta since the early 1990s but has not been observed to fruit .

= = Ecology = =

The fruit is consumed by many bird species including the rose @-@ crowned fruit @-@ dove (*Ptilinopus regina*) , wompoo fruit @-@ dove (*P. magnificus*) , wonga pigeon (*Leucosarcia melanoleuca*) , topknot pigeon (*Lopholaimus antarcticus*) , Pacific koel (*Eudynamys orientalis*) , Australasian swamp hen (*Porphyrio melanotus*) , Australian king parrot (*Alisterus scapularis*) , Australasian figbird (*Sphecotheres vieilloti*) , green catbird (*Ailuroedus crassirostris*) , regent bowerbird (*Sericulus chrysocephalus*) , satin bowerbird (*Ptilonorhynchus violaceus*) and pied currawong (*Strepera graculina*) , as well as the mammalian grey @-@ headed flying fox (*Pteropus poliocephalus*) , and spectacled flying fox (*Pteropus conspicillatus*) . It is one of several plant species used as food by the endangered Coxen 's fig parrot . Many fruits drop onto the ground around the tree , though others are dispersed by animals that eat them .

The thrips species *Gynaikothrips australis* feeds on the underside of new leaves of *F. rubiginosa* , as well as *F. obliqua* and *F. macrophylla* . As plant cells die , nearby cells are induced into forming meristem tissue and a gall results , and the leaves become distorted and curl over . The thrips begin feeding when the tree has flushes of new growth , and live for around six weeks . At other times , thrips reside on old leaves without feeding . The species pupates sheltered in the bark . The thrips remain in the galls at night , wander about in the daytime and return in the evening , possibly to different galls about the tree . Psyllids have almost defoliated trees in the Royal Botanic Gardens in Sydney in spring .

= = = Reproduction and life span = = =

F. rubiginosa is exclusively pollinated in a symbiotic relationship with *Pleistodontes imperialis* , a species of fig wasp . Biologist Eleanor Haine and colleagues analysed the DNA of the wasp across the fig 's range and determined four cryptic lineages forming what they term the *P. imperialis* species complex . They diverge to a greater degree than some distinct wasp species , yet form a monophyletic group ; this indicates that the wasp lineages have split without a change of host .

Fertilised female wasps enter the receptive ' fig ' (the syconium) through a tiny hole at the crown (the ostiole) . They crawl around the inflorescenced interior of the fig , pollinating some of the female flowers , before laying eggs inside some of the flowers and dying . After several weeks ' development in their galls , the male wasps emerge before the females . They chew holes in the galls containing females and fertilise them through the hole they have just chewed . Males return later to mated females , and enlarge the mating holes to enable the females to emerge . Some males then chew their way through the syconium wall , which allows the females to disperse after collecting pollen from the now fully developed male flowers . Females then have a short time (< 48 hours) to find a tree with receptive syconia to successfully reproduce and disperse pollen .

A field study in Brisbane found that *F. rubiginosa* trees often bore both male and female phase syconia at the same time , which could be beneficial for reproduction in isolated populations . The same study found that male phase syconia development persisted through the winter , showing that its wasp pollinator tolerated cooler weather than those of more tropical fig species . *F. rubiginosa* itself can endure cooler climates than other members of the genus .

P. imperialis crossed the waters between Australia and New Zealand some time between 1960 and 1972 , and seedlings of the previously infertile trees of *F. rubiginosa* began appearing in brick and stone walls , and on other trees , particularly in parks and gardens around Auckland . They have been recorded as far south as Napier . *P. imperialis* has been transported to Hawaii , California and Israel , where it has been observed to pollinate its host .

Trees can live to 100 years or more . They have been known to resprout after bushfire , bearing fruit within three years .

= = = Other life in the syconia = = =

As with many other *Ficus* species , the community of wasps inside the figs of *F. rubiginosa* is made up mostly of pollinator wasps . These develop deep inside the syconium , presumably protected

there from parasites . Also present are much smaller numbers of other wasp species , which do not pollinate the fig . At least fourteen species have been recorded , of which four ? two each belonging to the genera *Sycoscapter* and *Philotrypesis* ? are common while others are rare . Investigation of *F. rubiginosa* syconia found that the fig seeds and parasitic wasps develop closer to the wall of the syconium . The wasps of the genera *Sycoscapter* and *Philotrypesis* are parasitic and are around the same size as the pollinator species . Their larvae are thought to feed on the larvae of the pollinator wasp . Male *Sycoscapter* and *Philotrypesis* wasps fight other males of the same species when they encounter each other in a *F. rubiginosa* fig . Several genera of uncommon larger wasp species enter the immature figs before other wasps and induce galls , which may impact on numbers of pollinator wasps in the fig later . An example of this is *Pseudidarnes minerva* , a metallic green wasp species .

Nematodes of the genus *Schistonchus* are found in the syconia (and the pollinator wasps) of many species of fig , with *F. rubiginosa* hosting two species . They appear to be less species @-@ specific than wasps . *S. altermacrophylla* is generally associated with *F. rubiginosa* though it has been recorded on several other fig species .

= = Cultivation = =

Ficus rubiginosa was first cultivated in the United Kingdom in 1789 , where it is grown in glasshouses . It is commonly used as a large ornamental tree in eastern Australia , in the North Island of New Zealand , and also in Hawaii and California , where it is also listed as an invasive species in some areas . It is useful as a shade tree in public parks and on golf courses . Not as prodigious as other figs , *F. rubiginosa* is suited to slightly more confined areas , such as lining car parks or suburban streets . However , surface roots can be large and intrusive and the thin bark readily damaged when struck . Tolerant of acid or alkaline soils , it is hardy to US Hardiness Zones 10B and 11 , reaching 10 m (35 ft) high in 30 years . Planting trees 8 ? 12 m (30 ? 40 ft) apart will eventually result in a continuous canopy . The trees are of great value in providing fruit for birds and mammals , though drop large quantities of fruit and leaves , leaving a mess underfoot .

In a brief description , William Guilfoyle recorded a variegated fig from New South Wales " 12 ? 15 ft high " in 1911 as *F. rubiginosa* variety *variegata* . A variegated form is in cultivation on Australia 's east coast , and in the United States . It is a chimera lacking in chlorophyll in the second layer of the leaf meristem . The leaves have an irregular central green patch along the midvein with irregular yellow and green elsewhere . Leaves that grow in winter generally have larger green patches than those that do in summer . The chimera is unstable , and branches of all @-@ green growth appear sporadically .

Despite the relatively large size of the leaves , it is popular for bonsai work as it is highly forgiving to work with and hard to kill ; the leaves reduce readily by leaf @-@ pruning in early summer . Described as the best tree for a beginner to work with , it is one of the most frequently used native species in Australia . Its bark remains smooth , and does not attain a rugged , aged appearance . Known as " Little Ruby " , a narrow @-@ leaved form with its origins somewhere north of Sydney is also seen in cultivation .

F. rubiginosa is also suited for use as a houseplant in low , medium or brightly @-@ lit spaces , although a variegated form requires brighter light . It has gained the Royal Horticultural Society 's Award of Garden Merit . It is easily propagated by cuttings or aerial layering .

The light @-@ coloured wood is soft and brittle . Lightweight , it has some value in the making of such items as toys and small boxes .