



Bush Tucker in Hawai'i

At a Glance

What is Bush Tucker? "Tucker" is Australian slang for food, possibly derived from the word "tuck" as in "tuck into some food." The term "bush tucker" or "bush food" refers to foods native to Australia and consumed by the local peoples before the arrival of colonists in the 18th century. It can consist of any plant, insect, animal, or plant extract found in the Australian wilderness or outback.

It also describes those native items used in ritual and cultural practices or as medicine. It is estimated there are more than 5,000 species of native foods on the Australian continent, some of which have been in use for more than 60,000 years.

In this Extension publication, we will highlight four plants from Australia that have potential in Hawai'i as niche crops. The focus is on fruit crops with unique flavors, textures, and nutrient composition.

Ooray

Davidsonia pruriens F. Muell, Family: Cunoniaceae

Introduction and Origin

"Ooray," "Davidson's plum," "Davidsonian plum," and "sour plum" are common names for the fruit of three species of the genus *Davidsonia*. The genus was named after a pioneer sugar-cane grower from Queensland, J. E. Davidson. Ooray grows in tropical and subtropical rainforests in Northeast Queensland. Related species are from more temperate areas in New South Wales.

The fruit has been popular for thousands of years among the country's tribal communities and gained popularity in more recent times, thanks in part to a resurgence of Australia's culinary community. Ooray is from the Aboriginal Dyrbal dialect around Tully Queensland and the name is now being more widely used in commerce. It is currently cultivated in Eastern Queensland and used in a wide variety of value-added products as part of a growing bush-food industry. The wood of *Davidsonia* trees is dense but is not recommended as timber because the trees are small and have slender stems.

Aboriginal names for the fruit in different dialects in the same region:

Wuray (Jirrbal, Mullunburra/Yidin) - Northeast Queensland around Cairns and the southern Atherton Tablelands.

Wiiraa (Ngadjon) - South of Cairns.

Munumba (Djabugay) - rainforests of Northeast Queensland.

Jirirr (Yalanji) - Cape York Peninsula, Queensland.

The crop is thought to have come to Hawai'i in the 1980's with producing trees currently in South Kona. The Hawai'i Tropical Fruit Growers distributed close to 500 trees between 2016 and 2020.

November 2020

Subject Category:

Fruit, Nut, and Beverage Crops, FN 57

Ken Love

Hawai'i Tropical Fruit Growers

Robert E. Paull

Department of Tropical Plant
and Soil Sciences

paull@hawaii.edu, (808) 956-7369

THIS INFORMATION HAS BEEN
REVIEWED BY CTAHR FACULTY

Ooray Species and Their Description

The genus *Davidsonia* contains three rainforest species: *Davidsonia pruriens* F. Muell., *Davidsonia jerseyana* (F. Muell. Ex F.M. Bailey) G. Harden & J.B. Williams, and *Davidsonia johnsonii* J.B. Williams & G. Harden (Harden and Williams, 2000). The genus is in the Family Cunoniaceae, mostly found in Australia, New Guinea, and New Caledonia. The family is in the Order Oxalidales, which also contains carambola.



Figure 1. Ooray flower inflorescence are borne on the trunk of the tree. The fruit when ripe are dark purple, like a small plum.

Davidsonia pruriens: “Ooray” trees are tall (60 ft.) and have thin stems with dark brown or grey flaky bark that terminate in a dense canopy containing many branches. It is covered with numerous long hairs that are irritating when handled. Lower leaves usually drop off, exposing the stem. The compound leaves (2 to 4 foot-long) are compound, lanceolate, and have a terminal pinna. Pinnae pairs become smaller towards the base, and stipules are usually present. Inflorescences (12 to 32 inches long) produce hanging flowers on exposed stems and have between two and 24 lateral spikes. Flowers (1/4 to 1/3 inches long) are dark pink with four or five sepals. They contain male and female organs, and are self-fertile.

The fruit is a drupe with a dark red, edible, fleshy mesocarp surrounded by a dark blueish-purple skin resembling European plums. The compressed ovoid shape can be as much as 2.5 inches long, 2 inches wide and almost 2 inches deep. Each fruit has two laterally compressed seeds with soft fibers on the margins. Usually only one seed is viable.

Davidsonia jerseyana: This species is indigenous to lowland rainforests in Northeast New South Wales. They are adapted to a range of soil types but prefer high levels of organic matter and consistent rainfall throughout the year to maintain adequate soil moisture levels. Adult trees can survive frost, but frost causes leaf burn in juvenile trees.

This species is a smaller tree (18 to 35 foot) and has single or multiple slender stems, each with a terminal tuft of leaves. Leaves (16 to 32 inches long) are similar to *D. pru-*

riens, but have a winged rachis. Stems, leaves, and fruit have irritating surface hairs. Inflorescences (<10 inches long) occur on exposed stems, are pendent, compressed panicles, containing dark pink-red flowers, with a description similar to *D. pruriens*.

Davidsonia johnsonii: This species differs from the other two in that its fruit contains no viable seeds. It is a bushy tree (15 to 30 foot) that is well branched and has a dense, leafy crown. It spreads via root suckers. Leaves (4 to 12 inches long) are similar to other *Davidsonia* species, narrow-lanceolate and with stipules present. Inflorescences and flowers are similar to other species, however, they differ in that the inflorescence (4 to 8 inches long) are borne among the leaves, styles are reduced or absent, and pollen is absent. Surface hairs are non-irritant.



Figure 2. Ooray fruit born on the trunk. High winds can also cause the terminal leaf clump with fruit to break-off. Wind can also cause fruit scarring as the skin rubs against the stem, and in this case, sunburn as a result of sudden exposure to full sun.

Varieties

There are no recognized varieties. The plant grows true to types from seed, with bearing in five to eight years.

Growing Conditions

The tree is well adapted to Hawai'i's wide range of soils and will grow from sea level to 3,500 feet, with a pH from 5.2 to 5.5 being suggested. They thrive on organic matter, in moist, well-drained, friable soils, and high rainfall. The trees will tolerate full sun, though fruit sunburn has been reported. The tree is however susceptible to strong winds. The original Kona tree broke with strong winds and the weight of 500 fruit, although new full-sized leaf growth appeared about 3 months later.

Propagation

Ooray is most often grown from seed in Hawai'i. Recent tissue culture production is used by growers in Australia and a lesser extent in New Zealand.

Training and Pruning

The trees are spaced at 8 to 16 feet in rows and about 16 feet apart. *Davidsonia jerseyana* trees are planted at a narrower spacing of 3 to 8 feet within rows that are 12 feet apart. Because fruit are produced on the stem, increased yields are achieved by removal of apical shoots on young trees to induce multiple stems.

The trees should be managed for ease of harvest by topping or training for multiple trunks. Notching the trunk will often, but not always, produce flowering at a lower height than the canopy.

Windbreaks and shelter trees are used commercially to prevent wind and sun damage. The fruit is particularly susceptible to sunburn.

Fertilization

There is no substitute for a good soil and tissue sample to give you the most accurate reading for proper NPK fertilizer recommendations. The most common formula used on Ooray in Hawai'i is 8-8-8 Complehumus with micronutrients. A handful or ¼ cup applied 4 times a year works well. Any other lower numbered fertilizer can be used, as well. The type of fertilizer used and frequency of fertilization can depend on such things as soil type, soil drainage, and amount of rainfall.

Irrigation

Mulching and irrigation are recommended to avoid water stress, particularly during flowering and fruit set. Once the tree is established, it can tolerate seasonal dry periods, though this should not occur during fruit set and growth. Rainfall between 48 and 98 inches/year occurs in its native habitat.

Pests and Diseases

Root pathogen have not been a major problem for *Davidsonia* species. A necrotic ring-spot disease infects *D. jerseyana* leaves on nursery stock under humid, low-light conditions in cooler months. Other reported pests in commercial plantations of *D. jerseyana* include caterpillars, seed borers, and fruit flies. *D. pruriens* bears fruit in the autumn/winter months when insect pest pressure is

lower. Reported pests in Australia include beetles, budworms, fruit borers, leaf hoppers, and fruit flies.

Harvesting and Yield

In its native range, Ooray sets fruit during the cool season with a wider flowering and fruiting period when cultivated. Harvest should be done every two to three days with the fruit picked as it develops a purple blush. The fruit continues to ripen after harvest. When harvesting, it is necessary to avoid contact with irritant hairs.

Fruit should be harvested with care into bags or cartons that are protected from the sun. The field heat should be removed as soon as possible. As the tree can exceed 25 feet, long picking poles can be used to harvest mature fruit that have not turned fully purple. Harvesting fruit from this height, however, is slow and costly, and the fruit are more likely to suffer mechanical injury. As mentioned above, the tree height should be managed by pruning so that harvesting can be achieved without ladders or picking poles. The recommended tree height is generally less than 8 feet.

Postharvest Considerations

The fruit can be left to ripen for about a week to reach full color and allow sugar development. The fruit can be stored at about 40° to 50° F with high humidity for several days and can be frozen.



Figure 3. The fruit can be eaten fresh or made into jam or chutney or sauces.

Packaging Pricing and Marketing

Whole fruit are sold individually in Hawai'i's farmers markets or in pint containers averaging \$3 to \$10 per pound. They are often purchased by chefs, leaving little if any for grocery consumers. Freezer bags (8 cups) of frozen pulp can sell for between \$50 and

\$75 when available. As more fruit becomes available, prices are expected to stabilize.

Table 1. Proximate composition and nutritional value, from USDA (ndb.nal.usda.gov)

Proximity	Amount per 100g edible portion	% DV
Water	78.2 g	N/D
Energy	63 Kcal	N/D
Energy from Fat	1.8 Kcal	
Energy	264 kJ	N/D
Protein	1 g	2.00%
Total Fat (lipid)	0.2 g	0.57%
Ash	1.1 g	N/D
Carbohydrate	14.3 g	11.00%
Total Sugars	3.9 g	N/D
Glucose (dextrose)	1.3 g	N/D
Fructose	2.5 g	N/D
Nitrogen	0.16 g	N/D
Starch	10.4 g	N/D
Calcium, Ca	16 mg	1.60%
Iron, Fe	mg	0.00%
Magnesium, Mg	27 mg	6.43%
Phosphorus, P	18 mg	2.57%
Potassium, K	364 mg	7.74%
Sodium, Na	45 mg	3.00%
Vitamin B3 (Niacin)	0.17 mg	1.06%
Total folate	29 µg	N/D
Vitamin C (Ascorbic acid)	30 mg	33.33%
Retinol	13 µg	N/D
Beta Carotene	80 µg	N/D
Alpha Carotene	16 µg	N/D

*Above mentioned Percent Daily Values (%DVs) are based on 2,000 calorie diet intake. Daily values (DVs) may be different depending upon your daily calorie needs. Mentioned values are recommended by a U.S. Department of Agriculture. Calculations are based on average age of 19 to 50 years and weight of 194 lbs.

Culinary Use and Nutritional Composition

The fruit has an attractive appearance and look similar to European plums. They contain high levels of anthocyanins and natural pigments that are all strong antioxidants. The antioxidant capacity is higher than the blueberry. The fruit is a good source of potassium, carotenoid (xanthophyll) lutein, vitamin E, folate, zinc, magnesium, and calcium. The skin contains the majority of these nutrients and thus, consumption of the whole fruit is recommended.

The taste is very sour because of high levels of fruit acids. Fresh fruit were consumed by the indigenous population but currently the pulp is made into a range of value-added products such as jams, sauces, salad dressing, wine, juices, cordials, preserved fruit and confectionary.

Due to its intense color, the fruit extracts is used as a natural food colorant. In Australia, the fruit is dried and milled to a powder for use in confectionaries and drinks. Jelly and jam have been sold at Hawai'i's farmers markets.

Midyim (Midgen)

Austromyrtus dulcis (C.T. White) L.S.Sm. Family: Myrtaceae

Introduction and Origin

This species is native to Northeastern New South Wales and Southeastern Queensland. The "midgen berry" or "midyim", also known as "Silky myrtle" and "Sand berry," is a favorite of the aboriginal tribes along the eastern coastal areas of Australia.

In Hawai'i, plants have been established since the early 1980's, most likely from a single source. The same source was used to establish the berry in Florida and California. As all three locations have bushes up to 10 feet tall growing in close proximity to each other, there is little fruit. Additional plant material is called for in order to increase cross pollination.

The average plant in Hawai'i will produce close to 500 flowers, yet yield only about six fruit. This problem of poor pollination should be corrected in the next few years with additional material from Australia.

Description

This small spreading under-story scrub grows up to about 6 feet and is commonly found on sandy soil on heaths or at the margins of rainforests. In Hawai'i, the scrub can get much taller, often reaching 20 feet. The bark is finely flaky with young shoots being hairy.



Figure 4. Midyim flowers and fruit. Fruit picture used with permission from Alamy.



The lanceolate to elliptical leaves are opposite on the stem and are ½ to 1½ inches long and ¼ inches wide. The leaves are glossy above and silky hairy beneath. Flowers are solitary, axillary or on a short raceme-like inflorescence of up to 6 flowers; flower stems (pedicels) are about 1/8 inches long. The flower's calyx tube has long soft to silky hairs and is about 1/10 inches long. The five downy white petals are about 1/8 inches, with stamens just under 1/4 inches long, and style that is slightly shorter.

The plant is easily recognized for its characteristic berries in summer and autumn. The fruit are about 1/4 to less than ½ inches in diameter, white and covered in small blue-black spots, giving an overall mauve appearance. The fruit contains 3 to 9 pale brown seeds.

Production Practices

Midgen tolerates most soils and also grows well at sea level in sandy areas but should be shielded from salt sprays. Full or partial sun is ideal, but the plant will also survive in shaded understory areas. However, excessive shade can cause plants to be less vigorous.

The seeds germinate readily in 3 to 4 weeks. Though the seeds possess a hard seed coat, scarification is not required. Stem cuttings also root readily. When planted from cuttings, fruit can be expected in the first year.

Midgen can be trained as an attractive flowering hedge rows. A plethora of white flowers bloom multiple times a year in Hawai'i. Pruning is only necessary to keep the scrub height at the desired level and if training into a hedge.

Irrigation in dry periods is advisable. The plants will tolerate daily irrigation as long as there is ample drainage. Low dose fertilizer (8-8-8), 3 or 4 times a year with organic mulch and compost is recommended.

There is no detailed information on pests and diseases with few being reported. Myrtle leaf rust caused by *Austropuccinia psidii* has caused damage in Australia. The fruit does attract birds in Australia.

Culinary Uses and Nutritional Composition

The slightly crunchy berries are eaten fresh and have an aromatic sweetness on par with blueberries. The flavor has been described as gingery and nutmeg. The small berry-like fruit are often used in fruit salads, jams, pies, and confections.

Table 2. Proximate composition from Miller et al., (1993) (ND = Not Determined)

	Per 100 gm
Calories	386 kJ
Water g	75.8
Protein g	0.9
Fat g	0.3
Carbohydrates g	22.5
Na mg	70
K mg	140
Ca mg	50
Fe mg	5.1
P mg	ND

Lemon Aspen

Acronychia acidula F.Muell. Family: Rutaceae

Synonyms: *Jambolifera acidula* (F.Muell.) Kuntze,
Acronychia superba Domin

Introduction and Origin

Lemon Aspen, also known as Hard Aspen and Lemon Wood, was first formally described in 1864 by Victorian state botanist Ferdinand von Mueller. The species name 'Acidula' or slightly acid refers to the taste. The genus contains 44 species found in Asia, Australia, and the islands of the Pacific. About 20 species are native to Australia, with lemon aspen being the best known. It is found in the highland rainforests and Atherton tablelands in north Queensland up to 3,800 ft and regrows well in disturbed

areas. Lemon Aspen is now cultivated from northern New South Wales to north Queensland

Introduced to Hawai'i in the early 2000s, there are currently a few plantings outside of South Kona. The fruit has been mistaken for Otaheite gooseberry, *Phyllanthus acidus* Skeels.

Description

The plant is a quick-growing shrub/small tree that can

reach a height of 50 feet and can also be produced in pots or kept pruned as a hedge. The elliptical-shaped, dark-green leaf blades are about 4 to 7.5 inches long by 2 to 4.25 inches wide. The underside of the leaf is only slightly paler than the upper surface. Crushed leaves often emit an odor similar to mango skin.

The inflorescences are usually more than an inch long, with each flower being about half an inch long. The white flower has eight stamens of different lengths in one whorl, the four long stamens alternate with four short stamens. The flower disk and style are yellow, while the ovary and stigma are green. The crisp pale green to yellow fruit (0.75 inches) is globular and are formed in heavy bunches.



Figure 5. Lemon Aspen rooted cuttings and fruit. Fruit photograph courtesy of Specialty Produce, San Diego.

Seed cotyledons are about half an inch long with a toothed margin. First and second pairs of true leaves are trifoliate. At the 10th leaf stage, the leaf blade is inconspicuously toothed and more conspicuous than on earlier leaves. Seed germination time is 51 to 226 days when fresh.

Production

The trees prefer moist well-drained soils and full sun, but do not tolerate strong wind. The tree is rapid growing and requires regular pruning to maintain a desirable fruit harvesting height. It should bear within four years of planting from seedlings.

The plants are usually propagated from seed sown immediately after cleaning. Some limited success has been obtained with firm cuttings from current season growth.

Culinary Uses and Nutritional Composition

The fruit can be eaten raw or cooked and has a sharp citrus flavor (Ringer and Ringer, 1998). The taste is usually described as a mix of lime and grapefruit. The strong flavor

Table 3. Proximate Composition and other nutrients

	per 100 g edible portion
Energy	120 kJ
Water	-
Protein	2.0 g
Fat	0.9 g
Carbohydrates	1.9 g
Total Sugar	1.9 g
Fibre	-
Ca	133 mg
Cu	0.83 mg
Fe	13.25 mg
Mg	148 mg
P	129 mg
K	1513 mg
Na	45 mg
Zn	3.9 mg
Mn	10 mg
Mo	13 ug
K:Na	-
Folate	-
Vit E	-

lends it use in salad dressings, curd, syrup, cordial, juice, and as a glaze. The fruit has high antioxidant activity and thus, is also used in botanical-based cosmetics, like face washes.



Figure 6. Lemon Aspen value-added products being marketed, such as pickles and dried fruit powder, and an example of use in savory dishes like crushed marlin and grilled pineapple.

Magenta Lilly Pilly

Syzygium paniculatum Gaertn, Family: Myrtaceae

Synonyms: *Syzygium coolminianum*, *Eugenia paniculate*, *Eugenia rheedioides*.

Introduction and Origin

Syzygium is a genus in the Myrtaceae family that includes a number of popular species cultivated for their colorful, edible fleshy fruit. There are perhaps 1,000 species of *Syzygium* trees or shrubs native to the Old-World tropics (Ellshoff et al., 1996). The genus name *Syzygium* is from the Greek *syzygos*, meaning "yoked together," possibly referring to the paired leaves. Australia is home to 52 *Syzygium* species commonly called Lilly Pilly, mostly found in Queensland, with many of them popular as ornamental plants.

The *Syzygium* species cultivated for their economically important edible fleshy fruit include *S. aqueum*, Water apple, a tree native to India through Malaysia; *S. cumini*, Java plum, a tree native to India, Sri Lanka, and Malaysia; *S. jambos*, Rose apple, a tree which probably originated in Malaysia and possibly southeastern Asia; *S. malaccensis*, Mountain apple, and the more popular *S. samarangense*, most commonly called Wax apple, are trees with a native range from Malaysia to southeastern Asia.



Figure 7. Magenta Lilly Pilly flower and fruit are typically red, although a dwarf variety has light-purple fruit. Photo of red fruit used with permission from www.budget-plants.com. Photo of purple fruit used with permission of Jeff Howes, Australian Plant Society resources.austplants.com.au/plant/syzygium-paniculatum-dwarf-form.

Magenta Lilly Pilly (*S. paniculatum*) is also known as Scrub cherry, Magenta Cherry, and Brush Cherry. It is an endangered species of flowering plant native to central New South Wales (NSW) coastal areas, from Jervis Bay south of Sydney to Taree north of Newcastle in scattered remnant rainforests on grey soil over sandstone near the sea. In the Aboriginal dialect Cadigal from around Sydney, it is called 'Daguba.'

The crew of Captain Cook's First Voyage on the 'HMS Endeavour' in 1770 were probably the first Europeans to eat the Magenta Lilly Pilly (Banks, 1998). As Brazil cherry was used to describe a number of different fruits, it is unclear if this arrived in Hawai'i with Cook or shortly after with the later voyages of Capt. Vancouver in the 1790s. Vancouver was a midshipman on the 'HMS Discovery,' the companion ship to Cook's 'HMS Resolution' on Cook's second voyage.

Though endangered in the wild, the plant is widely cultivated in eastern Australia as an ornamental. In earlier records, it has been confused with *S. australe* (H.L.Wendl. ex Link) B. Hyland that has a paler trunk and found more widely in coastal areas, from south of Sydney in NSW to Queensland.

Archibald Menzies was the botanist on Capt. Vancouver's 1790 to 1795 around-the-world voyage that included three winters spent in Hawai'i as they charted the north-west coast of North America. Menzies with three other men climbed Mauna Loa in 1794 with a portable barometer and recorded a height of 13,564 feet (current height 13,679 feet). His name is commemorated in a number of plants, including Douglas Fir (*Pseudotsuga menziesii*).

Other seeds are thought to have come to Hawai'i from California in the 1900s. Hedge rows were planted at the Mealani Agricultural Research Station in Waimea on the Big Island in 2012.

Table 4. Proximate Composition - Magenta Lilly Pilly from Miller et al., 1993.

	per 100 g edible portion
Energy	89 kJ
Water	93.4 g
Protein	0.3 g
Fat	0.1 g
Carbohydrates	5.0 g
Sodium	3 mg
Potassium	18 mg
Calcium	4 mg
Iron	0.1 mg

Additional Bush Tucker Species

Species	Common name
<i>Acacia</i> spp	wattle seeds
<i>Adansonia gregorii</i>	boab
<i>Buchanania arborescens</i>	sparrow's mango
<i>Citrus gracilis</i>	kakadu lime
<i>Eugenia carissoides</i>	Cedar Bay cherry
<i>Ficus racemosa</i>	cluster fig
<i>Manilkara kaukii</i>	wongi
<i>Melastoma affine</i>	blue tongue
<i>Mimusops elengi</i>	tanjong
<i>Physalis minima</i>	native gooseberry
<i>Terminalia ferdinandiana</i>	kakadu plum
<i>Syzygium erythrocalyx</i>	Johnstone's River satinash
<i>Syzygium fibrosum</i>	fibrous satinash
<i>Syzygium suborbiculare</i>	lady apple
<i>Capparis</i> spp.	native caper, caperbush
<i>Capparis mitchellii</i>	wild orange
<i>Capparis spinosa</i> subsp.	wild passionfruit
<i>Carissa lanceolata</i>	bush plum, conkerberry
<i>Citrus glauca</i>	desert lime
<i>Enchylaena tomentosa</i>	ruby saltbush
<i>Ficus platypoda</i>	desert fig
<i>Marsdenia australis</i>	doubah, bush banana
<i>Owenia acidula</i>	emu apple
<i>Santalum acuminatum</i>	quandong, desert or sweet
<i>Santalum murrayanum</i>	bitter quandong
<i>Solanum centrale</i>	akudjura, Australian desert
<i>Solanum cleistogarnum</i>	bush tomato
<i>Solanum ellipticum</i>	bush tomato
<i>Acronychia acidula</i>	lemon aspen
<i>Acronychia oblongifolia</i>	white aspen
<i>Antidesma bunius</i>	Herbet River cherry
<i>Archirhodomyrtus beckleri</i>	rose myrtle
<i>Carpobrotus glaucescens</i>	pigface
<i>Citrus australis</i>	dooja
<i>Diploglottis campbellii</i>	small-leaf tamarind
<i>Eupomatia laurina</i>	bolwarra
<i>Ficus coronata</i>	sandpaper fig
<i>Melodorum leichhardtii</i>	zig zag vine
<i>Pleiogynium timoriense</i>	Burdekin plum
<i>Podocarpus elatus</i>	Illawarra plum
<i>Planchonella australis</i>	black apple
<i>Rubus moluccanus</i>	broad-leaf bramble
<i>Rubus probus</i>	Atherton raspberry
<i>Rubus rosifolius</i>	rose-leaf bramble
<i>Syzygium australe</i>	brush cherry
<i>Syzygium luehmannii</i>	riberry

Description

Magenta Lilly-Pilly in the wild shows little variation and may be a tetraploid. It is a slow-growing evergreen small tree or scrub that grows to about 50 feet, with a trunk diameter of 16 inches at breast height. The outer bark is pinkish- to reddish-brown, flaky on smaller trunks, turning platy on larger trunks. The simple lanceolate opposite leaves are up to 3 inches long and about 1 inch wide that tapers at the base. The leaves are dark green above and paler underneath. It can grow up to 12 inches per year and is often kept as a hedge.

The inflorescence is generally terminal and axillary toward the end of branches with a cluster of up to 11 white flowers. There are four rounded petals about quarter-inch long and several white stamens, each about three-quarters of an inch long. The flowers exhibit both self-pollination and cross-pollination.

The shiny fleshy fruit is globose to ovoid, up to almost an inch in diameter, topped with a permanent fleshy calyx. During development, the fruit is green turning to magenta when ripe – though white, purple or pink types occur.

Usually the fruit is single-seeded (about half-inch in diameter). The seeds are polyembryonic and apomictic, which could explain the low clonal differences and why seedlings are identical to the parent plant. Polyembryony has not been reported for other Australian *Syzygium* species, but had been reported for other Asian *Syzygium* species. For Magenta Lilly-Pilly, up to nine embryos have been found in one seed. Generally, one embryo is larger than the others, but all can produce a new plant. Life expectancy of the seeds is possibly less than three months.

Production

A variety named 'Verlaine' has been selected in Belgium that has dense foliage, with slightly smaller leaves and fewer flowers per cluster. This variety is reported to have annual flowering and colorful fruit. Registered names for ornamental selected varieties available commercially include 'Lillyput', 'Undercover', 'Little Lil', 'Orange Twist', 'Beachball', and 'Variegata'.

In the wild, it is found most commonly in sandy soils near the sea. It also grows well on deep rich well-drained soils. Tolerance to salty soils has been reported.

Although usually propagated by seed, cuttings from firm new growth is possible. Cuttings taken during spring and summer root more readily than those taken during the cool season when no growth is occurring. Seed germination occurs in about 20 days.

Myrtle Rust (*Uredo rangeli*) is a fungal pathogen in Australia. It is in a group of rusts that attack guava and other Myrtaceae in Hawai'i.



Scales and some mites can damage the tree and foliage, but neem oil and Safer soap are effective treatments. Fruit flies and birds are a problem for ripe fruit. In its native habitat, a number of seed predators and fruit insects are found, including species found in Hawai'i that bore into the fruit, buds, bark and cause galls.

Culinary Uses and Nutritional Composition

The ripe fruit has a slightly bitter sour flavor and are eaten fresh or made into jam, chutneys, sauces, drinks, and desserts. The major aroma volatiles are the terpenes, such as pinene, ocimene, limonene, and terpineol, and are similar to the terpene-rich volatiles from other *Eugenia* species.

Acknowledgments

The authors greatly appreciate the help provided by Peter Salleras, Fruit Forest Farm, Mission Beach, Queensland; Margo Watkins, Australian Tropical Bushfood Orchard, Mungalli, Queensland; and Yan Diczbalis, principal horticulturist, Department of Agriculture and Fisheries, Queensland, Australia. Ms. Andrea Kawabata provided excellent editorial help that greatly improved the brochure's readability.

The project was supported by a Farmer-Rancher Grant from USDA's WSARE (Western Sustainable Agriculture Research & Education) to Ken Love. Dr. Paull was supported in part by the U.S. Department of Agriculture, National Institute of Food and Agriculture, under an agreement 58-2040-5-010 through the Agriculture Research Service and Hatch Project H862.

Literature Cited and Further Readings

Ooray

Davidsonia pruriens F. Muell, Family: Cunoniaceae

- Ahmed AK, Johnson KA (2000) Horticultural development of Australian native edible plants. *Australian Journal of Botany* 48, 417-426
- Anonymous. 2014. Davidson Plum. Part of an R&D program managed by the Rural Industries Research and Development Corporation. https://anfab.org.au/edit/research_publications/14-112_DavidsonPlum.pdf
- Ashmore, S., Nand, N., Drew, R.A. and Peace, C.P., 2004, September. Genetic Diversity Between Three Species of *Davidsonia*-the Australian Native Plum. In. International Symposium on Harnessing the Potential of Horticulture in the Asian-Pacific Region 694 (pp. 105-109).
- Drew, R. A. 2008. Cunoniaceae, *Davidsonia* spp. F. Muell., *Davidson's plum*. Pp 313-314. In. Janick, J. and Paull, R.E. eds. *Encyclopedia of Fruit and Nuts* - Wallingford, United Kingdom: CABI. <https://doi.org/10.1079/9780851996387.0000>
- Harden, J. and Williams, J.B. (2000) A revision of *Davidsonia* (Cunoniaceae). *Telopea* 8, 413-428. <https://pdfs.semanticscholar.org/6983/66ba3c395e-4c6eef11dd5f23b86f37731904.pdf>
- Hardwick, P. (1996) *Davidson's plum connoisseurs delite*. Australian Rainforest Bushfood Industry Association Newsletter 3, 4-13. https://anfab.org.au/main.asp?_=Davidson%20Plum
- Hotson, A. (2000) *Davidson Plum*, New Industry Handbook-Native Food, Rural Industries Research and Development Corporation Canberra, Pub.No.08/021 <https://www.agrifutures.com.au/wp-content/uploads/publications/08-021.pdf>
- Low, T., 1991. *Wild Food Plants of Australia*. Angus and Robertson, Sydney, Australia.
- McDonald, J., Caffin, N.A., Sommano, S. and Cocksedge, R., 2008. The effect of post harvest handling on selected native food plants. Rural Industries Research and Development Corporation, Department of Primary Industries & Fisheries, Queensland. Accessed 2020 July 04. http://era.daf.qld.gov.au/id/eprint/5104/1/RIRDC_06-021.pdf
- Nand, N., Drew, R.A. and Ashmore, S. (2004) Micropropagation of two Australian native fruit species, *Davidsonia pruriens* and *Davidsonia jerseyana* G. Harden & J.B. Williams. *Plant Cell, Tissue and Organ Culture* 77, 193-201. https://www.researchgate.net/profile/Sarah_Ashmore/publication/226677670_Micropropagation_of_Two_Australian_Native_Fruit_Species_Davidsonia_pruriens_and_Davidsonia_jerseyana_G_Harden_JB_Williams/links/5446ef8f0cf2f14fb811cdd3/Micropropagation-of-Two-Australian-Native-Fruit-Species-Davidsonia-pruriens-and-Davidsonia-jerseyana-G-Harden-JB-Williams.pdf
- Netzel M, Netzel G, Tian Q, Schwartz S, Konczak I (2006) Sources of antioxidant activity in Australian native fruits. Identification and quantification of anthocyanins. *Journal of Agricultural and Food Chemistry* 54, 9820-9826.
- Richmond, R., Bowyer, M. and Vuong, Q., 2019. Australian native fruits: Potential uses as functional food ingredients. *Journal of Functional Foods*, 62, p.103547.

Riley JM (2001) Wild fruits of Australia. WANATCA Yearbook, 16-22.

Sommano, S., Caffin, N. and Kerven, G., 2013. Screening for antioxidant activity, phenolic content, and flavonoids from Australian native food plants. *International Journal of Food Properties*, 16(6), pp.1394-1406. <https://www.tandfonline.com/doi/full/10.1080/10942912.2011.580485>

Zhao, J. and Agboola, S.O., 2007. *Functional Properties of Australian Bushfoods: A Report for the Rural Industries Research and Development Corporation*. Rural Industries Research and Development Corporation.

Online Resources

- Witjutigrub Bush Food Nursery www.witjutigrub.com.au
- www.fruitsinfo.com/davidson-plum-fruit.php
- www.healthbenefitstimes.com/davidson-plum/#:~:text=100%20grams%20of%20raw%20Davidson,and%2010.4%20grams%20of%20starch.

Midyim (Midgen)

Austromyrtus dulcis (C.T.White) L.S.Sm. Family: Myrtaceae

Drew, R.A. and Bailey, R., 2018, October. Australian tropical fruits: a source of distinctive flavours. *Acta Horticulturae* 1274, 41-56.

Elliot, W. R and D. L. Jones. 1993. *Encyclopaedia of Australian Plants* Vol 6, K-N Lothian, Melbourne.

Fraser Island Defenders Organization. ND. Myrtle Rust Backgrounder No 87-3doc <https://fido.org.au/wp-content/uploads/2015/07/87-Myrtle-Rust-%e2%80%93-A-major-threat-to-the-integrity-of-K%e2%80%99gari-Fraser-Island-Backgrounder.pdf>

Miller, J.B., James, J.K. & Maggiore, P.M.A. 1993. *Tables of Composition of Australian Aboriginal Foods*. Aboriginal Studies Press, Canberra.

Snow, N., Guymer, G.P. and Sawvel, G., 2003. Systematics of *Austromyrtus lenwebbia*, and the Australian species of *Gossia* (Myrtaceae). *Systematic Botany Monographs*, pp.1-95. <https://www.jstor.org/stable/25027907?seq=1>

Wilson, P. G. 1991. *Austromyrtus dulcis* (C.T.White) L.S.Sm. <http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Austromyrtus~dulcis>

Online Resources

- plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Austromyrtus~dulcis
- www.fruitipedia.com/2018/10/midyim_austromyrtus_dulcis/
- www.witjutigrub.com.au/index.php/info-sheets/21-midyim-or-midgen-austromyrtus-dulcis
- uv2garden.com/midgen_berry.html
- www.fruitsinfo.com/midyim-fruit.php#Nutritional-Value

Lemon Aspen

Acronychia acidula F.Muell. Family: Rutaceae

Ahmed AK, Johnson KA (2000) Horticultural development of Australian native edible plants. *Australian Journal of Botany* 48, 417-426

Chippendale, G. M. 1988. *Flora of Australia Series, Vol. 19, Myrtaceae: Eucalyptus, Angophora*. Australian Government Publishing Service, Canberra, ACT. <https://www.environment.gov.au/system/files/pages/639cb95c-caba-408d-8657-98581bd790eb/files/flora-australia-19-myrtaceae-v2.pdf>

Costermans, L. 1981. *Native Trees and Shrubs of South Eastern Australia*. Revised edition. Lansdowne Publishing Pty. Ltd. Sydney.

Elliot, W.R., D. L. Jones and T. Blake (1983). *A-Ca. Encyclopaedia of Australian plants suitable for cultivation*. Lothian Publishing Co. Pty. Ltd., Port Melbourne, Victoria.

Ford, G., G. Ford, J. Stokes and T. Dixon. 1999. *Gordon Ford: The Natural Australian Garden*. Bloomings Books Pty. Ltd., Hawthorn, Vic. Australia. 126 page.

Gorst, J. R. 2002. *Indigenous Fruits of Australia*. *Acta Horticulturae* 575, 555-561.

Hartley, T. 1974. A Revision of the Genus *Acronychia* (Rutaceae). *Journal of the Arnold Arboretum*, 55(3), 469-523. Retrieved August 4, 2020, from www.jstor.org/stable/43781951

Hyland, B. P. M.; Whiffin, T.; Zich, F. A., Duffy, S., Gray, B., Elick, R., Venter, F. and Christophel, D. 2010. "*Acronychia acidula*". *Australian Tropical Rainforest Plants*. Edition 7.0, online version [RFK 7.0]. http://www.anbg.gov.au/cpbr/cd-keys/RFK7/key/RFK7/Media/Html/entities/Acronychia_acidula.htm. Retrieved 2020 August 04.

von Mueller, F. (1864). *Fragmenta phytographiae Australiae*. Melbourne: Victorian Government Printer. pp. 154–155.

Zhao, J. and Agboola, S.O., 2007. *Functional Properties of Australian Bushfoods: A Report for the Rural Industries Research and Development Corporation*. Rural Industries Research and Development Corporation. Publication No 07/030

Online Resources

- [anfab.org.au/main.asp?_Lemon%20Aspen](http://anfab.org.au/main.asp?_=Lemon%20Aspen)
- tuckerbush.com.au/lemon-aspen-acronychia-acidula/
- www.anbg.gov.au/cpbr/cd-keys/RFK7/key/RFK7/Media/Html/entities/Acronychia_acidula.htm
- tropical.theferns.info/viewtropical.php?id=Acronychia+acidula

Magenta Lilly Pilly

Syzygium paniculatum Gaertn, Family: Myrtaceae

- Benson, D & McDougall, L 1998, Ecology of Sydney plant species part 6: Dicotyledon family Myrtaceae, Cunninghamia, 5, 808-987
- Drew, R.A. and Bailey, R., 2018, October. Australian tropical fruits: a source of distinctive flavours. Acta Horticulturae 1274, 41-56.
- Floyd AG. 1989. Rainforest Trees of Mainland South-Eastern Australia. Inkata Press, Melbourne, Australia.
- Hanson, I., Wilkinson, I., Ruming, S. and McKay, K., 2012. National Recovery Plan for Magenta Lilly Pilly *Syzygium paniculatum*. <http://www.environment.gov.au/system/files/resources/35fce028-9329-4eb2-a336-75f6b6c-c6d58/files/syzygium-paniculatum.doc>
- Hyland, B.P.M. (1983) A revision of *Syzygium* and allied genera (Myrtaceae) in Australia. Australian Journal of Botany Supplementary Series 13(9) 1-164. <https://doi.org/10.1071/BT8309001>
- Juniper, P.A. and Britton, D.R., 2010. Insects associated with the fruit of *Syzygium paniculatum* (Magenta Lilly Pilly) and *Syzygium australe* (Brush Cherry). Australian Journal of Entomology, 49(4), 296-303.
- Lebrun, A., Toussaint, A.N. and Roggemans, J., 1998. Description of *Syzygium paniculatum* Gaertn. Verlaïne and its propagation by stem cuttings. Scientia Horticulturae, 75(1-2) 103-111.
- Miller, J.B., James, J.K. & Maggiore, P.M.A. 1993. Tables of Composition of Australian Aboriginal Foods. Aboriginal Studies Press, Canberra.
- Payne, R.J. 1991. New findings of the rare tree *Syzygium paniculatum* (Myrtaceae) in the Wyong area, New South Wales. Cunninghamia. 2(3):495-498.
- Ramírez, F. and Kallarackal, J., 2019. The phenology and potential ecological associations of Magenta Lilly Pilly (*Syzygium paniculatum* Gaertn) a native vulnerable Australian tree growing in Bogotá, Colombia. Arboricultural Journal, 41(4), 191-211.
- Thurlby, K.A., Sherwin, W.B., Rossetto, M. and Wilson, P.G., 2007. Reproductive biology of the Magenta Lilly Pilly (*Syzygium paniculatum*) and its implications for conservation. The final report on the Australian Floral Foundation funded project. 32pp http://aff.org.au/wp-content/uploads/Wilson_Szygium_final.pdf.
- Thurlby, KAG, Connelly, C, Wilson, PG & Rossetto, M 2011, 'Development of microsatellite loci for *Syzygium paniculatum* (Myrtaceae), a rare polyembryonic rainforest tree', Conservation Genetic Resources 3, 205-208.
- Vuong, Q.V., Hirun, S., Chuen, T.L., Goldsmith, C.D., Bowyer, M.C., Chalmers, A.C., Phillips, P.A. and Scarlett, C.J., 2014. Physicochemical composition, antioxidant and anti-proliferative capacity of a lilly pilly (*Syzygium paniculatum*) extract. Journal of Herbal Medicine, 4(3), 134-140.

Online Resources

- en.wikipedia.org/wiki/Syzygium_paniculatum
- plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Syzygium~paniculatum
- anpsa.org.au/s-pan.html
- edis.ifas.ufl.edu/fp567