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Editor-in-Chief

Donald R. Hodel

University of California, Cooperative Extension

Los Angeles

drhodel@ucanr.edu

626-586-1973

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Trees in the Landscape, Part 11: *Alectryon excelsus* subsp. *excelsus*

Donald R. Hodel

University of California Cooperative Extension

700 W. Main Street

Alhambra, CA 91801

drhodel@ucanr.edu

Alectryon excelsus subsp. *excelsus* Gaertn.

This New Zealand native, a long-lived, moderately growing, small to medium, evergreen tree typically of good structure with handsome, glossy, dark green pinnate leaves and amazing if not spectacular seeds, makes a fine shade, specimen, park, residential, and even street tree. The seeds are indeed remarkable: imagine a black licorice gumdrop embedded in a ripe red

raspberry and you have a fairly accurate picture of the curious and eye-catching seeds (appearing nearly good enough to eat!), which are sure to draw attention in the garden or landscape (**Fig. 1**). It performs well in coastal plains and valleys from San Diego to San Francisco and is perhaps somewhat drought tolerant in central California but probably needs regular water in the southern part of the state to look its best.



Fig. 1. The amazing if not spectacular seeds of *tītoki* appear like a black licorice gumdrop embedded in a ripe red raspberry (Casa del Prado, Balboa Park, San Diego, CA).

Taxonomy and History

Common Names: New Zealand ash, New Zealand oak, *tītoki* (Māori). Early European settlers in New Zealand called it ash and later oak but the preferred term now is its Māori name (Parsons 2014).

Etymology: The genus name *Alectryon* is the Greek word for cockscomb and likely alludes to the red, fleshy, granular aril surrounding the seed that resembles a rooster's cockscomb in color and texture. The specific epithet *excelsus* is from the Latin *excelsa*, meaning tall or lofty, and perhaps alludes to the tall stature of this tree in comparison to adjacent trees in its native habitat.

History: Joseph Gaertner (1732-1791), a German botanist best known for his early works on seeds, *De Fructibus et Seminibus Plantarum*, named this species in that book in 1788, basing it on material from New Zealand.

Description

The description is from Allan (1961), Cheeseman (1925), de Lange et al. (1999), McClintock (2001), Muller and Haller (2005), Puplava and Sirois (2001), Salmon (1980), and supplemented from cultivated specimens in California.

Habit/Conformation: medium, slowly to moderately growing, broad-leaf, evergreen unarmed, monoecious tree to 60 feet tall and 40 feet wide (**Fig. 2**); much branched; canopy variable and irregular but generally tending to be rounded to broadly columnar, typically dense but sometimes open.

Trunk: typically single, rarely multiple, usually irregular and twisting, to 24 inches DBH (**Fig. 3**).

Bark: gray to dark gray or nearly black, smooth (**Fig. 4**).



Fig. 2. *Tītoki* is a medium, slowly to moderately growing, broad-leaf, evergreen tree tending to form an irregularly rounded canopy (Stowe House, Goleta, CA).



Fig. 3. *Tītoki* typically has a solitary trunk but sometimes has low multiple branches (Stowe House, Goleta, CA).

Leaves: unevenly pinnate, alternate; petiole 3 inches long; blade 6-13 × 4-8 inches, oblong; 3-7 pairs of pinnae and a single terminal one, these 1.75-4.25 × 0.75-1.60 inches, ovate-lanceolate to ovate-oblong, deep glossy green adaxially (upper) (**Fig. 5**), paler abaxially (lower), +/- thin-textured, acuminate to obtuse or subacuminate, margins smooth or remotely toothed; twigs and leaves with dense, short, soft, silky, rusty brown hairs especially when young.

Flowers: in much open and branched terminal panicles 4-12 inches long at branch tips in the spring and early summer (**Fig. 6**); flowers bisexual or staminate (male), lacking petals, purplish (**Fig. 7**), small, 0.10-0.15 inch wide, inconspicuous but fragrant,



Fig. 4. Bark of *tītoki* is gray and smooth (Stowe House, Goleta, CA).

on pedicels 0.2 inch long; calyx cupular but deeply cleft into 5 triangular, acute lobes, bases joined; stamens 6-8, anthers large, dark red, on fine, thread-like stalks; ovary hairy; all parts of inflorescence and flower with dense, short, soft, silky, rusty brown hairs especially when young.

Fruits: more or less woody capsule, 1- or 2-lobed, 0.30-0.50 × 0.25-30 inch, brown, swollen, with a ridge along one side ending in a spur, with dense, short, soft, silky, rusty brown hairs especially when young, mid to late summer, one year after flowering; seeds 0.30 × 0.25 inch, glossy jet black, globose, half embedded in fleshy, granular, scarlet, cup-shaped aril (specialized outgrowth of the attachment point of the seed or seed stalk) (**Figs. 1, 8**).



Fig. 5. Leaves of *tītoki* have three to seven pairs of glossy green pinnae (Stowe House, Goleta ,CA).

Distribution and Ecology

Tītoki occurs in moist to wet, lowland forest, mostly on alluvial soils, from sea level to 2,000 feet elevation on the North and South Islands of New Zealand. It is common and widespread on the North Island but on the South Island is found from the Banks Peninsula to central Westland. Rainfall varies but generally is distributed throughout the year, peaking in the winter months and declining somewhat in the summer although even in the summer each month has significant precipitation. Average daily temperatures range from the 50s to 60s°F. Frosts are uncommon, especially in the northern part of its range but become more frequent and severe in the south.

Environmental Tolerances

Although experience with *tītoki* is limited, it is surprisingly tolerant and adaptable despite its origin in moist to wet, somewhat moderate to cool areas. Although unlisted in

The *Sunset Western Garden Book* (Brenzel 1999), *tītoki* performs adequately in coastal California from San Diego in the south to the Bay Area in the north, meaning it is likely adapted to *Sunset Zones* 15, 16, 17, and 20 to 24 although it is marginal in Zones 20 and 21 because of severe heat and aridity. Indeed, extreme heat, aridity, and cold of areas farther inland likely preclude its use there. Its U. S. D. A. Cold Hardiness ranking is probably zones 9 and 10. Old, mature specimens will probably tolerate temperatures to about 20 F with minimal damage although young plants might be damaged at higher temperatures. *Tītoki* is likely not well adapted to the desert areas of southern California, western Arizona, and southern Nevada. It would likely perform well in cooler, upland areas of Hawai‘i, such as on the Big Island and Maui, but the risk of it becoming invasive needs to be determined (which see below under Weed/Invasive Species Risk).

Tītoki seems especially well adapted to the cool, moist, foggy, humid conditions of the coast and might actually perform slightly better in the Bay Area. It tolerates wind; however, it is intolerant of ocean and/or salt-laden wind (Parsons (2014)). *Tītoki* does tolerate light or heavy soils as long as they are well drained. It appears very well adapted to and grows best on deep alluvial soils (Salmon 1980). *Tītoki* seems to do better in slight acid rather than alkaline soils and is likely intolerant of poor drainage. The most limiting factors in its wider use might be intolerance of severe cold and the extreme heat and aridity of inland and desert areas.

Although not investigated, drought tolerance of *tītoki* is likely low and trees probably need regular irrigation, especially in warmer, more arid interior areas. However, Barry Coate (pers. comm.) reports that an established tree in San Jose looked adequate if not fine after 20 years without irrigation.

Propagation and Growth Rate

Tītoki can be readily propagated by seeds, which are typically available in mid to late summer in California. Seeds germinate readily within a month or so if handled correctly (Metcalf 1995 and personal observation). Sow seeds in a clean, moist, well drained and aerated medium and maintain the temperature at about 70 to 75°F. Metcalf (1995) reported that seeds, which can take 12 months to attain maturity, can be dry-stored for four to five months and still germinate fairly well although immediate planting gives the best results. Start seedlings in light shade but acclimate them to full sun after about a year. Cave and Paddison (1999) reported that young trees need sheltering and protection, especially from heavy frosts.

Tītoki has a moderate to fast growth rate when young in coastal California, attaining four to five feet in height after three years from seed. Growth tends to slow in older plants with trees in California typically



Fig. 6. Flowers of *tītoki* are in much branched terminal panicles in spring and summer (Zoro Gardens, Balboa Park, San Diego, CA).



Fig. 7. Flowers of *tītoki* are small, inconspicuous, lack petals, and have purplish stamens, which give the flowers their color (Los Angeles County Arboretum & Botanic Garden, Arcadia, CA).

growing to 15 to 20 feet in 10 years, 30 feet in 20 years, and 40 feet after 30 to 40 years. These growth rates are similar to those in New Zealand (Parsons 2014). Richards (1956) considered *tītoki* a hardy, moderately fast-growing tree if on fertile, deep soils.

Uses

Tītoki makes a superb park, lawn, shade tree, and specimen. The showy fruits are sure to attract attention and seem to persist on the tree, making it a suitable candidate for street tree use. Indeed, it is increasingly used as a street tree in New Zealand (Parsons 2014).

Pruning/Management

Tītoki has a strong tendency for straight, upright, single-leader growth and retention of lower branches and likely needs little training and pruning in the nursery and landscape, especially when young. Even if the leader is broken, it will usually readily

form a new leader and continue upright growth. Provide adequate space in the nursery and retain lower branches to encourage maximum trunk caliper. Because of strong, straight, upright growth staking is probably mostly unnecessary if trees are given adequate space. Nursery trees might only need light pruning to reduce canopy density and, when nearing readiness for sale, to remove lower branches to elevate the canopy if desired. Once in the landscape only judicious thinning out to reduce canopy density and light structural pruning might be necessary.

Trees would benefit from regular irrigation and fertilizer until established, especially during the growing season, but once established appear to perform adequately in turf or non-turf areas with occasional irrigation and no fertilizer. However, regular irrigation might be critical in warmer, more arid interior areas.



Fig. 8. Seeds of *tītoki* are shiny black and embedded in a scarlet, fleshy aril (El Prado, Balboa Park, San Diego, CA).

Problems/Litter

Tītoki is largely problem free; significant litter and structural issues are unknown. Little is known of the life span of *tītoki* but trees left standing in cleared pasture land in New Zealand are still alive after 100 years (Parsons 2104). The tree has no known health hazards.

Most of the trees I have seen in southern California over the last several years have thinned out canopies and some die back, likely from insufficient rain and irrigation. Although established trees in coastal central and northern California can probably tolerate inadequate water for several years without much damage, it seems that regular irrigation is critical in warmer and drier southern California.

Pests and Diseases

There are no serious pests and diseases of *tītoki* in California.

Weed/Invasive Species Risk

While *tītoki* has not been officially evaluated for invasiveness in Hawai‘i (HEAR-PIER 2014), it should be thoroughly assessed prior to planting; that another species of the genus, *Alectryon subcinereus*, is weedy and invasive in some gardens in southern California shows that the potential for invasiveness is present in the genus and this fact should encourage careful and thorough evaluation before planting out *tītoki* in the Islands. Invasiveness of *tītoki* has not been assessed for California but it is likely a low risk. Parsons (2014) and Stewart (1984) reported that birds eat the fruit and/or seeds, which would aid in their dispersal.

Availability

Tītoki is rare in the trade but is easily propagated from seeds, which are available in the summer in California.

Trees in California

McClintock (2001), writing about the trees in Golden Gate Park in San Francisco, stated that the first mention of *tītoki* there was in 1924. She described a superb specimen about 20 feet tall and of greater width on the west side of Conservatory Drive East south of the entrance to the Fuchsia Garden. She also noted a group of the three smaller trees on Hippie Hill and additional specimens in the San Francisco Botanical Garden at Strybing Arboretum. Outside of Golden Gate Park she listed a *tītoki* in the northeast corner of Dolores Park on the western edge of the Mission District.

David Kruse-Pickler (pers. comm.), commenting about the *tītoki* in the San Francisco Botanical Garden at Strybing Arboretum, noted that there were six trees ranging in height from 30 to 45 feet and in

width from 10 to 45 feet, all healthy and vigorous. The largest tree is a pre-1958 introduction while the smallest is a garden seedling or volunteer. The remaining four trees are early or mid-1980 accessions.

Long-time arborist Barry Coat commented (pers. comm.) about several other *tītoki* in the Bay Area. He noted that there was once a nice specimen at the old Saratoga Horticultural Foundation site on Williams Road in San Jose, now a fenced site with limited access of the San Jose Water Company. Barry had planted it in the mid 1980s and by 2010 it had grown to 18 feet tall with many upright trunks. He remarked that it was a great accomplishment considering it had not been irrigated for over 20 years. He also mentioned two good specimens of *tītoki* at the west entrance to the University of California at Berkeley.



Fig. 9. The Carrillo Recreation Center at 100 E. Carrillo St. in Santa Barbara, CA is home to a small but nice *tītoki*.



Fig. 10. The Casa del Prado Theater in Balboa Park in San Diego, CA has several nice *tītoki*, some of which produce seeds



Fig. 11. Paul Weissich provides scale for this *tītoki* near the concession stand adjacent to the Casa del Prado Theater in Balboa Park, CA.

Bracewell (2005) noted that for many years there was only one *tītoki* on the campus of Stanford University, which Dr. David Starr Jordan reportedly brought to the University in 1893, making it one of the earliest introductions of this species to California. Unfortunately, this tree was removed but a descendant raised from seed from Jordan's original tree is in the Stanford Avenue greenbelt opposite the intersection with Peter Couetts Road. The Grounds Department at Stanford intends to plant out more *tītoki* in the future.

Farther south in Santa Barbara there is a *tītoki* in front of the Carrillo Recreation Center on Carrillo Street (**Fig. 9**), one in lower Orpet Park, and one more on the west side of the 2000 block of Castillo Street (Mueller and Hall 2005). However, the nicest *tītoki* in Santa Barbara is likely the fine specimen at the Stowe House on Los Carneros Road in Goleta (**Fig. 2**).

In the Los Angeles area the Los Angeles County Arboretum and Botanic Garden has a *tītoki* that was obtained as a plant in 1994

and is now about 10 feet tall and about as wide.

Puplava and Sirois (2001), who noted that famous San Diego horticulturist Kate Sessions is credited with popularizing *tītoki* in southern California, list several specimens growing in Balboa Park, including on Village Place in front of the Casa del Prado, the Casa del Prado Theater (**Fig. 10**), and the nearby food concession (**Fig. 11**). Other trees in the Park are in the Zoro Gardens, at the House of Pacific Relations, and at the Spreckels Organ Pavilion. In the West Mesa area of the Park *tītoki* is north of the Bowling Green and on Nate's Point Dog Off-Leash Area (**Fig. 12**).

Notes

Alectryon, a member of the Sapindaceae or soapberry family (genera include *Acer*, *Aesculus*, *Cupaniopsis*, *Dodonea*, *Harpullia*, *Koelreuteria*, *Litchi*, and *Sapindus*, among others) (Stevens 2014), includes about 30 species of mostly tropical trees and shrubs

from the Philippines, Indonesia, New Guinea, Australia, New Caledonia, New Zealand and across the Pacific to Hawai‘i. The rain forests of Queensland and New South Wales in Australia are the center of diversity and harbor about 15 species (Reynolds 2014).

Alectryon species are typically characterized by having an aril, which is a specialized outgrowth from the funiculus (attachment point of the seed) that envelopes or is attached to the seed. Arils are usually fleshy and red or brightly colored and likely serve as enticements to birds or other animals to aid in seed dispersal. In many ways, an aril performs the same function as a fruit. Other plants having arils include lychee, longan, yew, oxalis, and castor-oil. Perhaps the most famous aril is that of nutmeg, which is the source of the spice known as mace.

Other *Alectryon* of note in California include the Australian endemics *A. tomentosus* and *A. subcinereus*. The former, which is

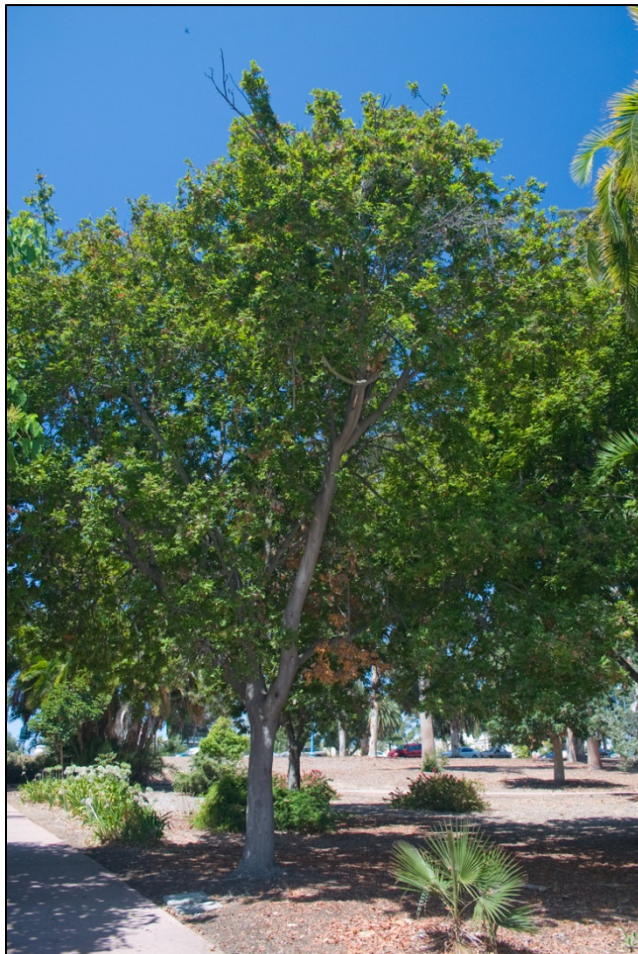


Fig. 12. Several *titoki* are water stressed and show some dieback in the West Mesa area north of the Bowling Green in Balboa Park, San Diego, CA.



Fig. 13. *Alectryon tomentosus* from Australia has leaves similar to those of *titoki* but its seeds, while attractive, are not as large and showy (1954-1716-S, Los Angeles County Arboretum & Botanic Garden, Arcadia, CA).

distinguished by its rusty hairy pinnae and thin-walled fruits (Reynolds 2014), grows well at the Los Angeles County Arboretum and Botanic Garden in Arcadia. Although a handsome tree its fruits are not as spectacular as those of *A. excelsus* subsp. *excelsus* (Figs. 13-15). *Alectryon subcinereus*, recognized by its flattened rachis and glabrous, bilobed fruits (Reynolds 2014), has proven to be a shrubby, weedy, and somewhat invasive plant at the Fullerton Arboretum on the campus of California State University in Fullerton.

The endangered Hawaiian endemic *Alectryon macrococcus*, known locally as *māhoe* or *‘ala‘alahua*, is rare in dry to mesic forests from about 1,000 to 3,000 feet elevation on Kaua‘i, O‘ahu, Moloka‘i, and Maui (Wagner et al. 1990). This handsome tree grows to about 30 feet tall and has leaves 8 to 22 inches long with two to five pairs of elliptic pinnae. These are 4 to 10 inches long, 2 to 5 inches wide, smooth, glossy, and conspicuously net-veined above, and brown tomentose below, especially when young. Fruits are from 1 to 3 inches in diameter and contain the typically black seed embedded in the red, fleshy aril although the latter is not as conspicuous as in *A. excelsus*. Rock (1913) noted that Hawaiians ate the fleshy, insipid and slightly sweet arils and mildly flavored seeds. This tree appears to be a good candidate for low-water-use landscapes in the Islands.



Fig. 14. *Alectryon tomentosus* has seeds similar to those of *tītoki* but they are smaller and not as showy (1954-1716-S, Los Angeles County Arboretum & Botanic Garden, Arcadia, CA).

A subspecies of *Alectryon excelsus*, *A. excelsus* subsp. *grandis*, once recognized as a separate species, is endemic to Great Island in the Three Kings Islands about 35 miles north of the northernmost point of the North island (deLange et al. 1999). It differs in its often shrubby or smaller, multi-trunked habit with a broadly rounded, dome-like canopy; fewer but larger and wider broadly oblong or ovate, bullate (puckered) pinnae; and larger flowers. Because of its exposed habitat it is likely more drought tolerant than subsp. *excelsus* but is also likely less frost tolerant. It does not appear to be cultivated in California. The attractive leaves with few, broad, puckered pinnae make it a tropical-looking, much sought-after plant and it is often grown side by side with subsp. *excelsus* in New Zealand. Unfortunately, the two subspecies hybridize and seeds gathered from either subspecies in cultivation there typically yield F1 hybrids

(deLange et al. 1995, New Zealand Plant Conservation Network 2014).

Parsons (2014) noted that *tītoki* is one of the most attractive and important forest canopy trees in lowland forest around Wellington and that its fruit is a favorite food of the *kereru*, the native wood pigeon. It can be a somewhat variable plant, especially when comparing young or juvenile individuals with adults. Seedlings and young plants tend to have deeply but irregularly lobed pinnae, the lobes being coarsely toothed (Allan 1961). Lobing and teeth tend to be less pronounced or totally absent in older individuals. Also, the degree of development of the showy red aril varies from prominent to lacking (Allan 1961), the latter a feature I have not noticed in cultivated California plants.

Māoris extracted oil from the seeds and used it medicinally for skin and eyes, hair cream, and ritual ceremonies (Cheeseman 1925). *Tītoki* yields a tough, but easily worked and elastic wood used for small tools, harness yokes for oxen and horses, and in coaches (Cheeseman 1925, Parsons 2014).



Fig. 15. While somewhat curious and interesting, seeds of *Alectryon tomentosus* are smaller than and not as showy as those of *tītoki* (1954-1716-S, Los Angeles County Arboretum & Botanic Garden, Arcadia, CA).

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Donald R. Hodel is the Environmental and Landscape Horticulture Advisor for the University of California Cooperative Extension in Los Angeles, a position he has held for over 31 years. Don develops and implements educational and applied research programs for the professional tree and landscape management industries. He specializes in the selection and management of trees and palms.

drhodel@ucanr.edu.