

FIELD GUIDE TO NEW ZEALAND'S
NATIVE TREES

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CONTENTS

Introduction 7

Conifers 9

Visual key to conifers 14

Tree ferns 51

Flowering trees 67

Visual key to flowering trees 72

Glossary 426

Further reading 430

Index 431

This book is derived from *New Zealand's Native Trees* by John Dawson and Rob Lucas (2012). The text was abridged and edited by Sue Hallas. The 'distinguishing features' boxes were compiled by Sue Hallas and Cathy Jones. Thanks to Barry Sneddon and Phil Garnock-Jones for contributing the introductions to conifers and flowering trees respectively. Thanks also to the photographers who supplied photographs as credited in captions.

First published in 2012 by Craig Potton Publishing

Craig Potton Publishing
98 Vickerman Street, PO Box 555, Nelson, New Zealand
www.craigpotton.co.nz

Text © John Dawson; photographs © Rob Lucas unless specified otherwise.
Design and layout: Jane Connor and Karen Jones
Cover design: Chris Chisnall

ISBN 978 1 877517 82 2

Printed in China by Everbest

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INTRODUCTION

WHAT'S SPECIAL ABOUT NEW ZEALAND'S NATIVE TREES AND FORESTS?

New Zealand's native trees and forests are unique. They look, smell and feel like no other forests, which is not surprising, as more than 80% of the c. 2300 native species of conifers, flowering plants and ferns in the flora as a whole occur nowhere else in the world. This remarkably high level of endemism is one of the reasons for New Zealand being recognised by Conservation International as a world biodiversity hotspot.

There are two main forest types in New Zealand: conifer–broadleaf and southern beech (*Nothofagus*). One of the most striking features of our conifer–broadleaf forests is the similarity, in many respects, to tropical rainforests. They consist of numerous species, usually in five strata: emergent trees (mostly conifers); canopy trees, such as tawa (*Beilschmiedia tawa*); subcanopy trees, such as nikau (*Rhopalostylis sapida*), and *Cyathea* and *Dicksonia* tree ferns; shrubby species and small trees; and ground plants. Not only are most species evergreen, they exhibit features that are typical of tropical rainforest species, such as: plank buttresses, cauliflory and ramiflory, pneumatophores and drip-tips (see glossary). Conspicuous, mostly woody vines are common, as are large epiphytes in tree crowns.

In comparison to conifer–broadleaf forest, beech forest has fewer species, predominantly *Nothofagus* spp., and a smaller range of plant lifestyles. Even though the trees are not leafless in the winter, beech forest is more like temperate forests of the Northern Hemisphere. The sparse undergrowth allows the columns of the tree trunks to be seen, the crowns of trees form the roof of the forest, and the small leaves, on branches often attractively arranged in horizontal layers, allow dappled sunlight through to the forest floor.

New Zealand's southern beeches are notable for hosting colourful mistletoe parasites. On wet

mountains near the treeline, beech forests are often swathed in mist, and with the constant high humidity, water drips from every twig. At these high altitudes, the trees are often stunted and contorted, giving these subalpine beech forests, often referred to as cloud forests or goblin forests, an otherworldly feel.

Elsewhere in the world, and particularly in subtropical and tropical areas, large, attractively coloured, flamboyant flowers are common and designed to attract specialist pollinators, such as nectar-feeding birds, long-tongued bees, hawk moths and butterflies. In New Zealand there are not many butterflies or nectar-feeding birds, and there are no native long-tongued bees or hawk moths. New Zealand has few plant species that attract specialist pollinators, most flowers appearing to be designed to attract all comers, especially the small flies and moths that are abundant. Consequently, many are tiny, greenish to white, and lack specialised structures that restrict access to all but favoured pollinators. As if to make up for the modest little flowers of most of the species, the fruits that follow are often large, colourful and fleshy, and are eaten by birds.

A number of species of New Zealand trees have a distinctive juvenile form. Perhaps the most remarkable of these are the lancewoods (*Pseudopanax crassifolius* and *P. ferox*), in which the juvenile form has long, narrow leaves that are angled downwards around a slender stem, but the adult form has much shorter, broader leaves and a densely branched, broadly rounded crown. Other remarkable examples of juvenile forms are those that are termed divaricating. Divarication is usually associated with shrubs, which have a densely twiggy form, with very small leaves, and slender, wiry, interlacing stems with wide-angled branching. However, some tree species, including mātāi (*Prumnopitys taxifolia*) and kaikōmako (*Pennantia corymbosa*), have shrubby, tangled, divaricating juveniles that grow into tall, single-trunked adults.

WHAT IS A TREE?

Trees are woody, single-trunked plants that can reach many metres in height. It may seem obvious that they are different from shrubs, which are woody, multi-stemmed plants that are relatively short, growing perhaps 3.5 m tall, often less. However, the distinction between these two groups is not always clear.

For many of the species included in *Field Guide to New Zealand's Native Trees*, there is no confusion; they fit neatly into this definition of a tree. The difficulty in definition arises with plants that are mostly shrubby, with multiple trunks, but occasionally become single-trunked specimens of 4 m or more, such as many of the coprosmas; or where some individuals usually considered shrubs develop substantial branch systems, reaching heights of 4 m or more, such as some olearias. Another unclear example is when the trunk is so short that the plant seldom reaches 4 m and so barely attains the height of a tree, for example *Cordyline banksii*. Can these plants justifiably be included in a book on trees?

In deciding which of these hard-to-categorise species to include in this book, we have generally taken an inclusive approach and incorporated woody species that, at least occasionally, grow more than 4 m tall and either have a single trunk or substantial woody limbs. There are some exceptions to this rule, where plants have been included to give more complete coverage to a genus.

ABOUT THIS BOOK

Like *New Zealand's Native Trees*, from which this field guide is derived, the book is arranged in three parts: Conifers, Tree Ferns and Flowering Trees. Within these main parts, which each have a brief introduction, species are in alphabetical order.

Scales have not been included alongside illustrations because of the size variability within species; by referring to the measurements given in the text, readers will be able to ascertain the approximate scale. However, in the quick-reference visual guide to conifers (pages 14–15), flowering trees (pages 72–97) and certain genera (e.g. *Coprosma*), leaves are shown to scale.

Upward-pointing arrows beside clearcut illustrations of leaves denote the upper surface; downward-pointing arrows, the underside. Illustrations are numbered sequentially for each species entry; where an entry continues over the page, the numbering continues in sequence on the new page.

Locations and months for photographs are not given in this field guide, but this information is included in *New Zealand's Native Trees*.

Where a plant included has been classified as a 'threatened' plant under the New Zealand Threat Classification System, its threat status has been given as one of three categories: 'nationally critical', 'nationally endangered' or 'nationally vulnerable'. Plants that are designated 'at risk' under this system have not generally been noted.

CONIFERS

WHAT IS A CONIFER?

Conifer is a Latin word for 'cone-bearing' and alludes to cones being the typical reproductive structure of this group of plants. Among other things, they are separated from other plant groups by their scale- or needle-like leaves, or leaf forms that have been derived from them, and by female or seed cones with a unique structure. The great majority of conifers, including all New Zealand species, are evergreen.

TRUNK, BARK & RESIN

In most conifers, the trunk is cylindrical and tapers distinctly upwards. Large trees, such as kahikatea, can have buttressed and fluted trunks. Other conifers, such as kauri, have massive columnar trunks that barely taper throughout their length.

The bark of conifer species varies considerably, especially on mature trees. Most species have smooth bark on young trees, varying in colour and surface irregularities such as blisters, bumps, ridges and lenticels. Mature bark may be smooth, or roughened by ridges, furrows and lenticels in a variety of patterns, and by the shedding of strips or irregular-shaped flakes. Rimu bark is shed in large, thick flakes, whereas kauri, kahikatea, mātai and miro have smaller bark flakes that, when shed, leave a 'hammer-mark' pattern on the trunk. In some conifers, the bark is papery, peeling away in long (e.g. *Libocedrus* spp.) or short (e.g. mountain tōtara) vertical strips or sheets; or it can be

fibrous-stringy, furrowed and often light brown, as in tōtara, and peeling away from the trunk in long, persistent strips.

Conifer wood is referred to as softwood and that of flowering trees as hardwood, because of their differing hardness. Some exceptions are the 'softwood' mātai, which is extremely hard, and the 'hardwood' whau, which is softer and lighter than any conifer woods. The most valued native conifer timbers include kauri, tōtara, rimu, mātai and miro.

Resin is a sticky substance formed in the roots, trunk, branches and leaves of many conifers. Its function is to help protect the tree from mechanical damage, attack by invading insects and wound invasion by pathogenic fungi. It is produced and stored in specialised secretory structures called resin ducts and resin blisters. When first secreted by a wound, resin is runny, but it quickly hardens into a gummy mass that provides an effective seal over the wound. Among the New Zealand conifers, kauri is most notable for prodigious resin production (kauri gum or kāpia).

FOLIAGE & JUVENILE FORMS

The leaves of conifers can be broadly grouped into scale leaves, needle leaves and some broader forms, with a variety of intergrading shapes in between. Leaves consist of three parts: the base, which is a cushion-like point of attachment of the leaf to the stem; the blade, which is the green, photosynthetic part of the leaf; and the petiole or stalk, which links

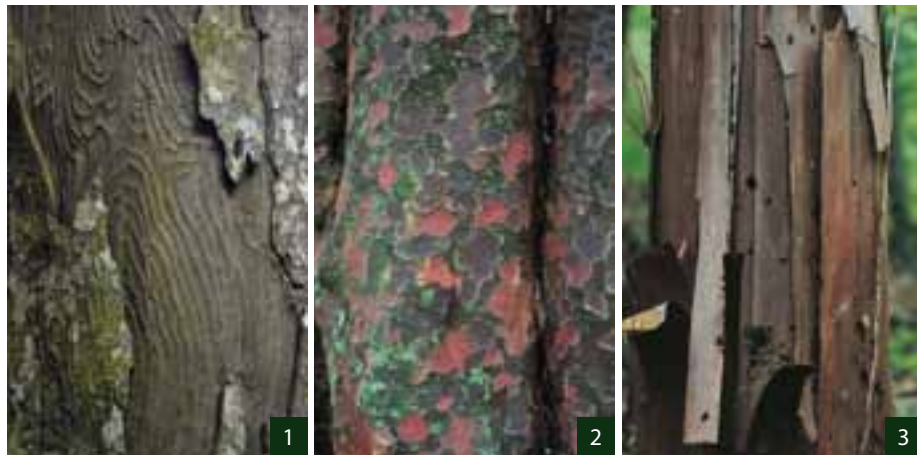
the blade to the leaf base and is typically short in conifers. Scale leaves are small, short leaves that usually lack a petiole and are pressed against the stem of their branchlet. Needle leaves are much longer than scale leaves, narrow, parallel-sided, angular or flattened in cross-section, and mostly pointed at the tip. Broad leaves are also much longer than scale leaves, flat in cross-section and often widest at the middle, with curved margins that taper gradually or abruptly towards the base and pointed or rounded tip. Scale leaves generally have a single mid-vein, as do needle leaves, and broad leaves have a single mid-vein or numerous parallel veins (as in kauri).

The stomata (breathing pores) of conifer leaves, which are not visible individually without

magnification, may be grouped in whitish, waxy bands or patches on protected leaf surfaces as, for example, in mātai and *Libocedrus* spp.

The genus *Phyllocladus*, which is represented in New Zealand by three species, is very unusual among the conifers in that its photosynthetic organs are flattened stem structures called phylloclades. Small, green leaves are present on seedlings and

1. Bark of mature rimu, showing the distinctive 'contour-map' pattern of ridges. 2. 'Hammer-marked' mature bark of mātai. 3. Bark of mature kawaka, which separates in long strips. 4. Needle leaves of juvenile foliage of monoao. 5. Adult scale leaves of yellow-silver pine. 6. Young phylloclade of tanekaha, with small seed cones attached to some of its segments. 7. Adult foliage of pink pine, with scale leaves and a shoot reverting to juvenile needle leaves. 8. Juvenile mātai. 9. Mature mātai.



ephemerally on the most recent stems of adults; and minute, scale-like, curved, non-functional leaves occur on the margins of the phylloclades.

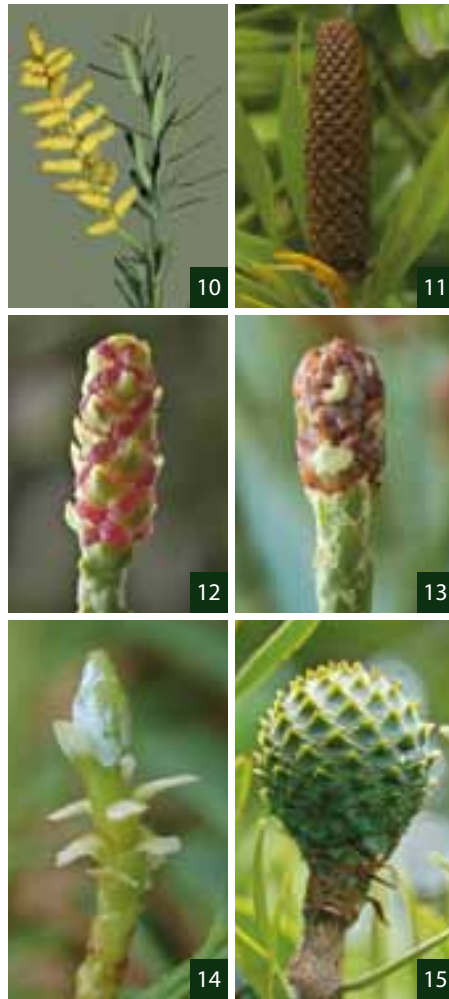
Some indigenous conifers pass through a sometimes prolonged juvenile stage in which the young plant differs in form from the adult. Notable examples are kauri, rimu, kahikatea and mātai. Young kauri trees have short-lived branches forming a spire-like crown, which can persist several decades before the spreading crown of the adult tree is established; trees in this stage of growth are called rickers. Juvenile rimu have longer branchlets and leaves than the adult, giving a weeping appearance to the foliage that is much more pronounced than in the adult; and kahikatea has a straggly juvenile stage with leaves that differ in form and arrangement from those of the adult. The most extreme difference occurs in mātai, which has a juvenile form that is markedly distinct from the adult. Juvenile mātai are divaricating shrubs with many slender, wiry, interlacing, wide-angled branches and relatively few leaves—in contrast to the form of the adult tree, with its single trunk and spreading crown.

In many other conifers, the leaves of juvenile plants also differ from those of adults in size, and often also colour and form; usually, the juvenile leaves are noticeably longer than the adult leaves. The transition from juvenile to adult foliage can be gradual, with juvenile leaves progressively changing form along the branch until the adult form is reached; or it can be abrupt and without intermediates, when branches bearing one type of leaf produce lateral branches with another leaf type.

REPRODUCTION

Male (pollen-bearing) and female (ovule-bearing) organs occur in different cones, referred to as pollen cones and seed cones, respectively. There are two typical sex distributions in conifers: monoecious (pronounced mon-ee-shus), where pollen and seed cones are both borne on the same individual (usually in separate parts of the crown); and dioecious (di-ee-shus), where an individual has either pollen or seed cones. However, these two sex distributions are not always absolute.

Pollen cones are borne at the tips of branchlets or in the axils of their leaves, or (in *Phyllocladus*) in the



axils of bracts near the tip of a short branch. Some species of *Prumnopitys*, such as *P. taxifolia* (mātai), are unique among living conifers in that the pollen cones are borne spirally on a specialised reproductive shoot (spike), which in turn arises laterally on a branchlet; spikes can have up to 40 pollen cones, each arising from the axil of a scale-like or leafy bract.

The pollen cone has a central axis to which the pollen scales are attached, and pollen sacs are attached underneath the scales. As the cones mature, the scales are pushed apart by the enlarging pollen sacs, which are often conspicuously yellow or red. The pollen sacs contain the pollen grains, which are



released at maturity when the wall of the pollen sac dries and splits open along a line of weakened cells. Pollen grains are shed in spring to early summer and are wind-dispersed.

Seed cones are borne at the tips of branches or branchlets, or in the axils of leaves, or (in *Phyllocladus*) in various positions on the phylloclades. They can bear from one to several hundred bracts, attached to the cone axis. Each fertile bract has a seed scale in its axil with ovules attached to (or embedded in) its upper surface. The bract and its seed scale can be separate from one another, or they can be partially fused with their tips free, or completely fused into a single cone scale (bract–seed scale complex).

Seed cones can take from about six months to three years to reach full size. In woody cones, the scales separate to allow the pollen grains access to the ovules within, and they close together again afterwards to protect the developing seeds.

10. A spike of male cones of mātai. 11. Pollen cone of kauri, with brown pollen scales. 12. Pollen cone of yellow-silver pine, with greenish pollen scales, each with two red pollen sacs underneath. 13. A mature pollen cone of monoao. 14. A young seed cone of miro at or shortly after pollination. 15. An immature seed cone of kauri. 16. Mature seed cone of rimu, with a fleshy, orange-red receptacle and a single seed seated in a red, cup-like epimatium. 17. Mature seed cone of silver pine. 18. Mature seed cone of bog pine with three seeds. 19. Mature seed cone of tōtara with one seed.

At the time of pollen dispersal (pollination), the seed cones are very small. The time interval between pollination and fertilisation varies in conifers but is usually c. 2–12 months. The fertilised ovum develops into the embryo of the seed.

Seed cones of conifers are variously adapted for different types of seed dispersal. Many cones have winged seeds, which are dispersed by wind action and gravity. These cones have woody or leathery cone scales that either gape apart at maturity to release their seeds or are shed, with their seeds, by cone shattering. Seed cones of the Podocarpaceae are adapted for bird dispersal. The principal bird dispersers of conifer seeds in New Zealand are the kererū, tūi and bellbird. In podocarp cones, the seeds are not winged, and some of the cone parts usually turn fleshy and coloured (often orange or red) at maturity.

The fleshy part of the cone below the seed(s) is referred to as the receptacle. Another fleshy structure is the aril, which is a doughnut-shaped cushion around the base of the seed. Birds feed on the seed cones but only the fleshy parts are digested, and the seeds, which pass unharmed through the bird's gut, are distributed in flight and under favoured perching trees.

The seed scale is quite variable in Podocarpaceae and is called the epimatium. At maturity, the epimatium can partially surround the base of the seed as a more or less fleshy sheath or it can cover its seed as an extra coat; in *Phyllocladus*, the epimatium has apparently been lost.

Some conifers have what is known as mast seeding years, in which copious seed production occurs; this happens at intervals of 2–10 or more years, with relatively meagre seed production in the intervening years.

The interval between seed fall and germination varies in conifers. In New Zealand species, the ripe seeds are usually shed in autumn. Seeds of many conifers germinate mainly in the following spring to summer, or they may lie dormant in the soil for 1–2 years or longer before germinating. Kauri seed is shed from late summer to autumn and germinates soon after falling.

BARRY SNEDDON

CONIFERS
(80% actual size)



Agathis australis, kauri,
p. 16



Podocarpus cunninghamii,
mountain tōtara, p. 42

Podocarpus totara,
tōtara, p. 44

Podocarpus acutifolius,
needle-leaved tōtara, p. 40



Phyllocladus toatoa,
toatoa, p. 36

Phyllocladus trichomanoides,
tanekaha, p. 38

Phyllocladus alpinus,
mountain toatoa, p. 34



Libocedrus plumosa,
kawaka, p. 30



Prumnopitys taxifolia,
mātai, p. 48



Prumnopitys ferruginea,
miro, p. 46



Libocedrus bidwillii,
pahautea, p. 28

CONIFERS
(not to scale)



Dacrydium cupressinum,
rimu, p. 20

juvenile

adult



juvenile

adult

Dacrycarpus dacrydioides, kahikatea, p.18



juvenile

adult

Halocarpus biformis, pink pine, p. 22



Lepidothamnus intermedius,
yellow-silver pine, p. 26



juvenile

adult

Halocarpus kirkii, monoao, p. 24



semi-juvenile

nearly adult

Manoao colensoi, silver pine, p. 32

WHAT IS A FLOWERING PLANT?

While conifers are characterised by having cones as the typical reproductive structure, flowering plants are characterised by having flowers. New Zealand has c. 2000 indigenous flowering-plant species, nearly 1% of the world's total, on just 0.18% of the world's land area, so this small country is a rich centre of plant biodiversity at the species level.

TRUNK & BARK

The main stem of a tree is usually stout and single, and is called the trunk. The major divisions (branches) divide repeatedly, becoming branchlets or twigs, which usually still bear leaves. The oldest wood is in the centre of the tree, and the oldest bark is on the outside.

The inner bark, or phloem, of flowering trees can be distinctive, as in the lacy networks of fibres that give ribbonwood and lacebark their common names, and in the coloured inner bark of coprosmas. Outer bark, or cork, can be very useful in identification of flowering trees. Lenticels—small patches of cells that allow gas exchange through the cork—may be obvious. Leaf scars can be stretched sideways as a tree trunk thickens to leave distinctive patterns, and the bark of some trees is often colonised by lichens.



FOLIAGE

The great majority of New Zealand trees are ever-green, with only six trees considered truly winter-deciduous, and a further seven semi-deciduous.

A leaf can be simple, with a single blade; or compound, with several blades (leaflets). The leaf and leaflets may or may not have stalks (or petiolules). In a compound leaf, the blades may fan out from a single point (palmate) or be arranged along a central axis, the rachis (pinnate). Perhaps the commonest leaf shape is lanceolate, broadest towards the base and tapering to a sharp tip. A broader version is ovate, and when the leaf is narrower, it approaches linear in shape. A leaf that's broader towards the tip, and tapers gradually towards its base is obovate, or oblanceolate if narrower. A leaf that's widest in the middle is elliptic, and variants can be described as broadly or narrowly elliptic.

The upper leaf surface is more likely to be glossy and smooth, whereas the lower is more likely to be dull and hairy, and might have prominent veins. A hairy covering, tomentum, is present in many leaves and is useful for identification. Leaf veins might be hidden beneath the surface or raised; sometimes just the mid-vein (midrib) is visible, other times the primary and secondary vein networks are apparent. Some leaves, like those of ngaio, have clear oil glands dotted throughout their tissue. The edge, or margin of a leaf may be smooth (entire), wavy (sinuate) or toothed (serrate).

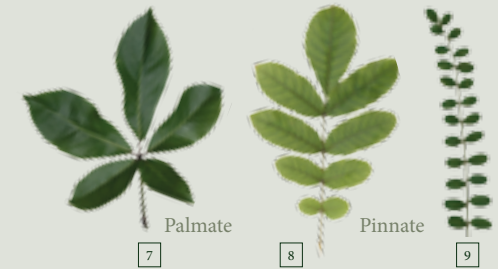
Domatia are found in eight genera of New Zealand trees and are a useful feature for identification. These small pockets or pits mostly form in the angle where lateral veins join the midrib of a leaf, and they may be fringed or filled with hairs.

Stipules are small accessory structures that form at the base of leaf stalks. Sometimes there are two, one on each side, but if the leaves are in opposite pairs, these might unite to form a single pair of stipules that join the leaf stalks on each side of the stem. In *Coprosma*, the shape and hairs of the stipules are important in identification.

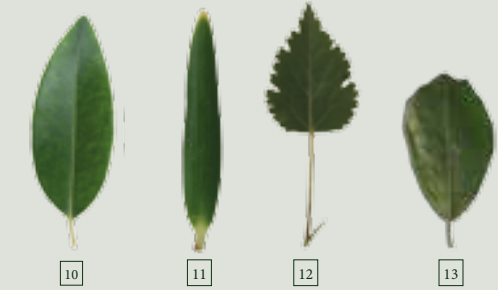
In flowering trees and conifers, new stems can arise only in the angle between a leaf and a stem, the leaf axil. Because flowers are actually specialised branches, they too must form in the axils of leaves, but often such leaves are very reduced in size and are then called bracts.



COMPOUND LEAVES



SIMPLE LEAVES



Leaves in opposite pairs on stem

Leaves alternate on stem



Leaves alternate and spiralled

Leaves opposite and decussate



Juvenile, transitional and adult leaves



Many native shrubs, and the juvenile stages of some trees, have divaricating growth forms, characterised by wide branching angles (often c. 90°), tough, slender stems, often with long internodes, and small leaves.

In many New Zealand native trees, both flowering trees and conifers, the juvenile and adult plants can have very different leaves. This is most pronounced in lancewood (*Pseudopanax crassifolius* and *P. ferox*), where the rigid, narrow, sharply toothed juvenile leaves hang down from the single stem. Later, when the tree grows taller and begins to branch, the leaf form changes. Adult leaves are shorter, broader, more shallowly toothed and softer, and they don't hang downwards.

Within a species, the arrangement of leaves on a stem follows a pattern that is the same for every individual, making it useful in identification and one of the features that is usually described. In many plants, the leaves are opposite, so that a pair of leaves arises from the same node, one on each side of the stem. Often, a pair of opposite leaves will be placed at right angles to the pair below, an arrangement called decussate. Leaves that are not opposite are usually spiralled around the stem, and such an arrangement is called alternate.

1. Interlacing phloem fibres of the inner bark of lacebark (*Hoheria populnea*). 2. Prominent lenticels in the outer bark of wineberry (*Aristotelia serrata*). 3. Outer bark of akeake (*Dodonaea viscosa*) peels off in long strips. 4. Coloured inner bark of *Coprosma linariifolia*. 5. Domatia of pūriri. 6. Stipules of *Coprosma grandifolia*. 7. Paté (*Schefflera digitata*). 8. Makamaka (*Ackama rosifolia*). 9. Kōwhai (*Sophora microphylla*). 10. Pōhutukawa. 11. *Leptecophylla robusta*. 12. *Hoheria lyallii*. 13. Kaikōmako (*Pennantia corymbosa*). 14. Tutu (*Coriaria arborea*). 15. Silver beech (*Nothofagus menziesii*). 16. *Leucopogon fasciculatus*. 17. *Veronica ligustrifolia*. 18. Juvenile (top), transitional (middle) and adult (bottom) leaves of *Pittosporum patulum*.

Ackama rosifolia

MAKAMAKA

CUNONIACEAE

Ackama rosifolia is a very attractive small tree with distinctive foliage and large heads of tiny white flowers followed by pink to scarlet fruits. The leaves resemble rose leaves, hence the specific name. They can be easily confused with juvenile leaves of tōwai (*Weinmannia silvicola*).

DISTRIBUTION & HABITAT Found only in central Northland, particularly along streams and in disturbed forest habitats.

SIZE Up to 15 m tall, with a trunk up to 60 cm in diameter.

BARK Smooth, greyish-brown with prominent lenticels; can be rough and corky in older trees.

FOLIAGE & HABIT Young stems, leaves and buds are covered with short brownish hairs. Leaves are pinnately compound, with up to 10 pairs of lateral leaflets in young plants, up to five pairs in adults. Terminal leaflets are thin, 3–6 × 1.5–3 cm; lateral leaflets have hardly discernible stalks, many narrowly pointed, marginal teeth and, where secondary veins meet the midrib, there are domatia underneath and corresponding bumps on the upper side. Stipules are broad, with few teeth, in opposite pairs, alternating with the leaf stalks at twig tips; they drop off early.

FLOWERS & FRUITS Flowers are white, very small (c. 3 mm across), and in much-branched inflorescences that can partly obscure the leaves. There are several stamens and two partly fused ovaries

at the flower's centre, with yellow nectaries around the base. Fruits are rounded, small, furry capsules, green at first then pink to scarlet, bearing the paired styles for some time. At maturity, they split into two valves, releasing small seeds covered with long hairs for wind dispersal. Flowering occurs in spring and fruiting is from mid-summer into autumn.

Ackama nubicola (turoa onamata) is a shrub to small (5–15 m tall) tree, often multi-trunked, found at only one location in the Waima Forest, Northland, at the base of small cliff faces and in second-growth forest. Its status as a threatened species is 'nationally critical.'

The leaves have fewer leaflets than makamaka (four pairs in juveniles, 2–3 pairs in adults), and the leaflets are larger (terminal leaflets 8–10 × 5–6.5 cm) and more rose-like, with a few small domatia; leaflet stalks are also longer. Stipules are persistent and disc-like, c. 14 × 18 mm, butter-yellow to cream, with purple bases and smooth margins. The capsules are whitish and furry. Flowering is from late summer to autumn; fruiting is from autumn into winter.

MAKAMAKA & TŌWAI

- Distinctive brownish hairs on leaves, young stems and buds of makamaka.
- Leaf stem is round in cross-section, whereas in juvenile leaves of tōwai it is flat on the upper surface, with a groove and ridge on either side.
- Marginal teeth on makamaka leaves are drawn out to a distinct point; teeth on juvenile tōwai leaves are blunt.
- Domatia on makamaka leaves (absent from tōwai).

1. The pinnately compound adult leaves of makamaka have short leaflet stalks that are difficult to discern. 2. Makamaka has a slender trunk and open branching habit. 3. Handsome juvenile leaves. 4. Masses of small white flowers. 5. Clusters of red fruits before releasing their seeds. 6. A pair of leafy stipules, with toothed margins; a leaf bud is developing between them. Note the short brownish hairs on the stems. 7. Underside showing domatia that are filled with hairs. 8. Close view of tiny flowers; note yellow nectaries. 9. Hairy immature capsules with two persistent styles.



Alectryon excelsus

TĪTOKI

SAPINDACEAE

Titoki, *Alectryon excelsus* subsp. *excelsus*, is an attractive, small tree with distinctive furry fruits—when ripe, each splits to expose a single black seed embedded in a layer of bright-red, convoluted tissue. Trees loaded with fruits are a striking sight.

DISTRIBUTION & HABITAT Found throughout the North Island in coastal and lowland forest, in the north of the South Island, and down to Banks Peninsula in the east and Karamea in the west. Prefers fertile alluvial river flats or sandy plains at low elevations (often growing with tawa), and low forest at exposed coastal sites (often growing with kohekohe). Drought-tolerant when established, but seedlings need shade and moist soil.

SIZE Up to c. 10 m tall, and trunk up to 50 cm or more in diameter.

BARK Smooth, pale grey to almost black.

FOLIAGE & HABIT Leaves are pinnately compound, dark olive-green. The terminal leaflet is often deflected to one side, and the tip of the leaf axis bears a small pointed structure (perhaps the true but undeveloped terminal leaflet). Leaflets are alternate, 3–7 on each side, narrow and mostly pointed at the tip, 5–10 × 2–5 cm. Juvenile leaflets are flat and strongly toothed along the margins; in adults, marginal teeth are absent or few, shallow and blunt, and the leaflet margins are usually downturned. Young leaves and twigs are densely furry with rusty-brown hairs, with hairs on leaf undersides persisting. The crown of the adult tree

is broad; the trunk base often has miniature plank or broader buttresses grading into slender roots.

FLOWERS & FRUITS Male and female flowers are borne on different trees (some bisexual flowers likely). Flowers are furry, tiny, dark red-purple and lacking petals, on elongate branching inflorescences that foliage may partly obscure. Male flowers have a ring of long-stalked stamens around a vestigial ovary; female flowers have short-stalked stamens and often small ('pollen-less') anthers. The ovary is furry, with the style bent to one side; it develops into a capsule that is densely furry with rusty-brown hairs, more or less globose with a ridge on top, c. 1 cm in diameter, and with one large, black, shiny seed in a bright-red aril. Capsules mature about a year later, then split to reveal one large seed surrounded by bright-red, fleshy tissue. Flowering is from spring into early summer. Fruits are targeted by native birds, particularly tūi but also introduced blackbirds.

1. Leaflets are alternate on pinnately compound leaves; note that the leaflet at the end is not terminal but attached to the side of the pointed tip of the leaf axis. 2. Two tall titoki trees with slender trunks and rounded crowns. 3. Mature trunk with buttresses that spread and branch before entering the soil. 4. Attractive foliage. 5. Dark-red branching inflorescence. 6. Female flowers with young capsules; note the curving styles and the non-functional stamens that are devoid of pollen. 7. Flower bud and male flower with stamens releasing white pollen. 8. Female flower stamens, which do not produce pollen. 9. Close view of the capsules, spectacular bright-red arils and shiny, black seeds.



Archeria traversii

ERICACEAE

Because of its stiff, narrow, alternate leaves, single-trunk individuals could be confused with soft mingimingi (*Leucopogon fasciculatus*), kānuka (*Kunzea ericoides*) or mānuka (*Leptospermum scoparium*) unless flowers or fruits are available.

DISTRIBUTION & HABITAT Found throughout the South Island, mostly in the west, and on Stewart Island, in lowland to montane shrubland and conifer-broadleaf forest.

SIZE Shrub to small tree (up to 5 m tall), each of the multiple trunks up to 15 cm in diameter.

BARK Brown, peeling off in long thin strips.

FOLIAGE & HABIT Leaves are simple, alternate, stiff, 7–12 × 1.5–3 mm, with marginal hairs and parallel veins. Branchlets of young growth are typically red.

FLOWERS & FRUITS Inflorescences are unbranched, terminal, also hairy, 10–25 mm long, with 8–16 flowers, each bell-shaped, 4–5 mm long and white through pink to strong, deep red; petals

are fused into a tube. Fruits are tiny (c. 2.5 mm in diameter), round, dry capsules, green when immature, brown when mature. Flowering is from late spring through the summer; capsules form from late summer into autumn, then release one seed per compartment.

Archeria racemosa is a North Island species, of similar habit and height, but the bark is black at the trunk base and all parts (leaves, inflorescences, flowers) are larger than those of *A. traversii*. It is found in high-altitude cloud forest on Great and Little Barrier islands and from the Coromandel Peninsula to slightly south of East Cape.

DISTINGUISHING FEATURES

- Archeria and soft mingimingi both have bell-like flowers, but those of soft mingimingi are very hairy and its fruit are red berries.
- Kānuka and mānuka have more open flowers with obvious stamens and have woody capsules somewhat flattened on top.



1. Twigs with whitish stems and also a whitish bloom on the leaf underside; note the parallel veins on the underside. 2. Small narrow leaves of *Archeria traversii* with red stems of new growth; some immature seed capsules are visible. 3. A small tree with many branches and a crown of small leaves. 4. Brown bark peeling off in strips. 5. Flowers with white petal tubes and small stamens. 6. Immature capsules with persistent styles.



Aristotelia serrata
WINEBERRY, MAKOMAKO
ELAEOCARPACEAE

This quick-growing tree is one of the few New Zealand trees that gradually loses its attractive leaves during winter; it is sometimes fully deciduous before new leaves and flowers develop together in the spring. At that time, the green of new leaves and the flowers in shades of cream to dark red provide a colourful display.

DISTRIBUTION & HABITAT Found throughout the country, including Stewart Island, in moist lowland to montane forest, as a coloniser of slips and other open sites following natural tree fall, storm damage or forest clearance.

SIZE Up to 10 m tall, with a trunk up to 30 cm in diameter.

BARK Pale brown, smooth and patterned with flat lenticels.

FOLIAGE & HABIT Leaves are in opposite or sub-opposite pairs, thin, large and broad (4–12 × 4–8 cm), with drawn-out pointed tips, prominent veins on top and bottom surfaces and deeply toothed margins; larger, narrowly pointed, irregular, jagged teeth bear smaller teeth. Some trees have red-purple leaf undersides (and twigs); others are just green. Leaves are on long stalks, with a pair of small

narrow stipules, sometimes with a few teeth. Pointed buds are in leaf axils. Branches are long and slender.

FLOWERS & FRUITS Male and female flowers are on different plants (with some bisexual flowers on male plants). Flowers are small, with 4–5 petals with rounded lobes in dense much-branched clusters, almost colourless at first then pink, red and dark red. Fruits are small berries (4–5 mm in diameter), red to dark red to almost black. Flowering is in spring; berries ripen in summer and are dispersed by birds.



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8

1. Leaves have a distinctive vein pattern, and the many pointed, marginal teeth, of varying size, are a remarkable feature. 2. Tree with new leaves and flowers in the spring. 3. Although the flowers are small, they are very colourful en masse; the white flowers are young and may change from pink to red as they mature. 4. Smooth, finely striated bark with lenticels. 5. Male flowers have shortish stamens that open at their tip to release pollen. 6. Female flowers, each with four long styles arising from the top of the ovary. 7. Berries range from green when young to red then black when mature. 8. Two of four narrow, greenish stipules at leaf-stalk bases; each leaf axil has a pointed bud.



1

Ascarina lucida

HUTU

CHLORANTHACEAE

Ascarina lucida var. *lucida*, is a small tree with attractive glossy leaves. The leaves of hutu and pukatea (*Laurelia novae-zelandiae*) may be difficult to distinguish.

DISTRIBUTION & HABITAT Found throughout the North, South and Stewart islands in lowland and lower-montane forest, but common only on the Coromandel Peninsula and in the west of the South Island.

SIZE Up to 6 m or more tall, with a trunk up to 30 cm in diameter.

BARK Pale and smooth.

FOLIAGE & HABIT Leaves are simple, yellowish green, glossy, 2–7 × 1.5–3.5 cm, thin to moderately thick, with a raised midrib and prominent marginal teeth, usually with dark-purple or black tips. Leaves are in opposite pairs, alternating with two groups of three bristles (sometimes more). Crushed leaves smell distinctively soapy. Twigs are dark purple with 4–6 longitudinal ridges, which extend into the bristles. Habit tends to be sprawly.

FLOWERS & FRUITS Male and female flowers occur on the same or different trees, on c. 3 cm-long branchlets in lateral and terminal inflorescences. Flowers are extremely small and reduced, with no petals or sepals. The male and female flowers, attached along the branchlets on short stalks, are very unusual, with their relatively large plump

anthers, which are each interpreted as a very reduced male flower. Above each anther are one or two small ovaries, each interpreted as one very reduced female flower.

The small (c. 2.5 mm long), fleshy fruits are whitish, sometimes with dark-purple blotches. Flowering is in spring, and the fruits form from mid-spring to mid-summer.



2



3



4

HUTU & PUKATEA

- Bristles at the base of leaf stalks in hutu are absent in pukatea.
- Twigs of hutu have 3–6 ridges; those of pukatea are square in section



LEFT: Bristles at leaf-stalk bases in hutu. RIGHT: Leaf-stalk bases in pukatea without bristles.



1



5



6

1. Note the coloured tips of the teeth. 2. Inflorescence with prominent stamens. 3. A small hutu tree with a slender trunk and a rounded crown. 4. Shiny hutu foliage. 5. The inflorescence has reduced male flowers, each with a single large stamen and a tiny female flower above. 6. Pure-white hutu fruits arranged on red-purple stem.