7. Flowers

Flowers are one of the most important features used to identify plants.

Kōwhai (*Sophora fulvida*) and kakabeak (*Clianthus puniceus*).

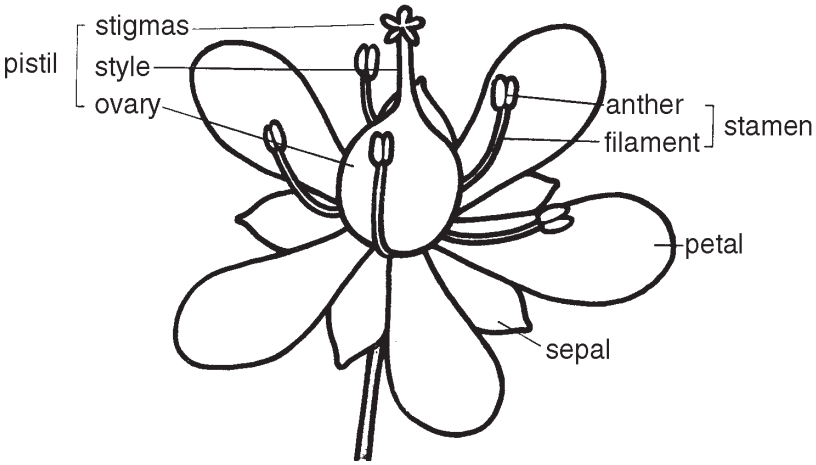
Flower types

The parts of a flower vary greatly from plant to plant. However, all tend to follow a basic pattern of:

- **Calyx**—sepals
- **Corolla**—petals
- **Stamens**—filaments and anthers
- **Pistils**—ovary, style, stigma

A **complete flower** has all the flower parts—sepals, petals, stamens, pistil.

An **incomplete** flower lacks one or more of these parts. Some flowers, e.g., *Clematis* spp. lack petals but have petal-like sepals. In these cases, the sepals are known as **tepals**.



Flower parts may be **free** (completely separate from each other) or **fused** (partly to wholly united). Fused parts may be:

- **Connate**—like parts, such as petals, fused to each other, e.g., the petals of fuchsia flowers are partly fused to form a tube
- **Adnate—**unlike parts, such as stamens fused to petals

Kōtukutuku (*Fuchsia excorticata*) petals are partly connate.

Flowers can also be described as 'perfect' or 'imperfect'.

❶ **Perfect** (hermaphrodite) flowers: have both sexual parts on one flower—functional stamens (male) and pistils (female).

e.g., horokaka (*Disphyma australe*).

❷ **Imperfect** flowers: functional stamens and pistils on different flowers, either on the same plant—**monoecious,** or on different plants—**dioecious**.

Monoecious: Male flowers and female flowers on the same plant.

e.g., shrubby tororaro (*Muehlenbeckia astonii*). ♀ left, ♂ right. *M. astonii* plants may also be dioecious.

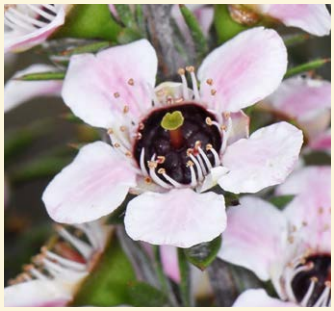
Dioecious: Separate male and female plants.

e.g., *Coprosma spathulata*, male (left) and female.

Some species, e.g., kōtukutuku/tree fuchsia (*Fuchsia excorticata*), may have perfect and imperfect flowers on the same plant.

Plants can also be split into two groups based on the symmetry of their flowers:

❸ **Regular**: actinomorphic (radially symmetrical).



e.g., mānuka (*Leptospermum scoparium*).

❹ **Irregular:** zygomorphic (bilaterally symmetrical).

e.g., bamboo orchid (*Earina mucronata*).

A male single-sex flower of dioecious *Coprosma rugosa.*

Thus, flowers can be:

❶ and ❸ Perfect and regular

❶ and ❹ Perfect and irregular

❷ and ❸ Imperfect and regular

❷ and ❹ Imperfect and irregular

A perfect, regular flower: Tararua gentian (*Gentianella montana* subsp. *ionostigma*).

Can plants count?

All flowering plants fall into one of two groups: monocotyledons or dicotyledons. When the seed of a monocotyledonous plant germinates, a single seed leaf appears, whereas dicotyledonous plants produce two seed leaves.

Monocotyledonous plants: Approximately 30 percent of New Zealand's flowering plants, including cabbage tree, orchids, nīkau, rengarenga, grasses, flax have flower parts in threes or multiples thereof e.g., six, nine.

Libertia grandifolia, a monocotyledon, has flower parts in groups of three,

Dicotyledonous plants: Approximately 70 percent of New Zealand's flowering plants. They usually have flower parts in fours or fives. For example, the **Pittosporum** family has 5 petals, 5 sepals, and 5 stamens and 1 ovary.

Kōhūhū (*Pittosporum tenuifolium*), a dicotyledon, has flower parts in groups of five.

Inflorescences

Flowers are either **solitary** (single) or have a few to many on a special flower branch called an **inflorescence.** This gives another clue to plant identity (see diagram below). Seven types of inflorescence are described here:

Composite head/capitulum: many small flowers tightly packed together, e.g., plants in the daisy family.

e.g., *Galinsoga quadriradiata.*

Corymb: modified raceme where stalks of lower flowers are elongated to same level as the upper flowers.

e.g., elderberry (*Sambucus nigra*).

Cyme: each branch terminated by a flower, new flowering branches emerge laterally below the flower.

e.g., willowherb (*Epilobium nummularifolium*).

Panicle: highly branched (multiple raceme).

e.g., bush lawyer (*Rubus cissoides*).

Raceme: flowers attached to main stem by short stalks.

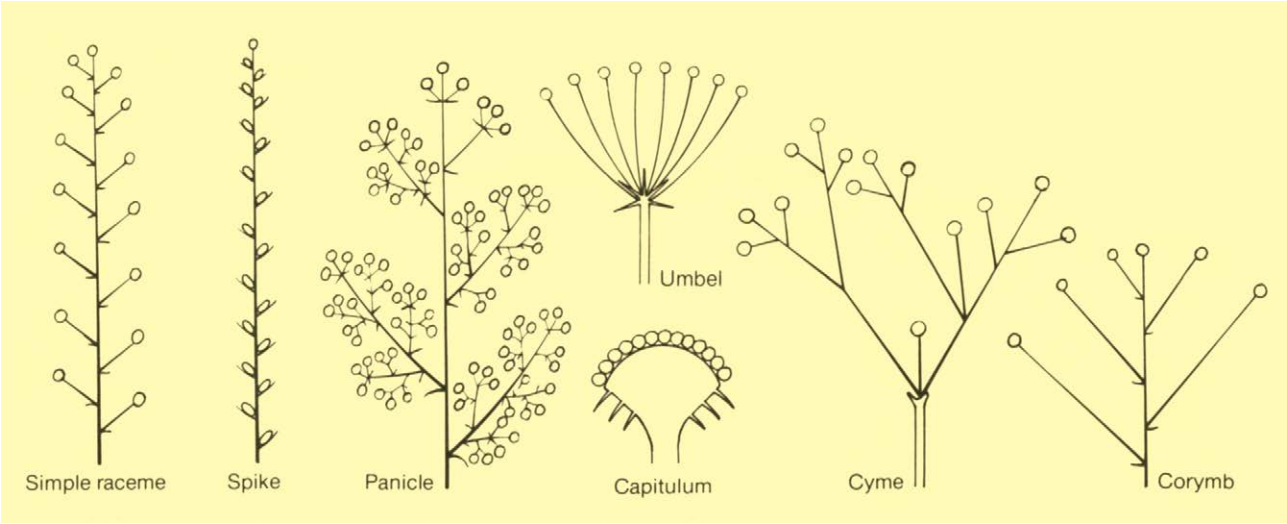
e.g., *Hebe perbella.*

Spike: flowers attached to main stem without stalks.

e.g., selfheal (*Prunella vulgaris*).

Umbel: "umbrella like"; the flower stalks arise from one point at the stem. Simple or compound.

e.g., carrot (*Daucus carota*).



Forms of inflorescences (from *The Native Trees of New Zealand* by J.T. Salmon).

From left: hinau (raceme), makomako (panicle), tarata (compound umbel).

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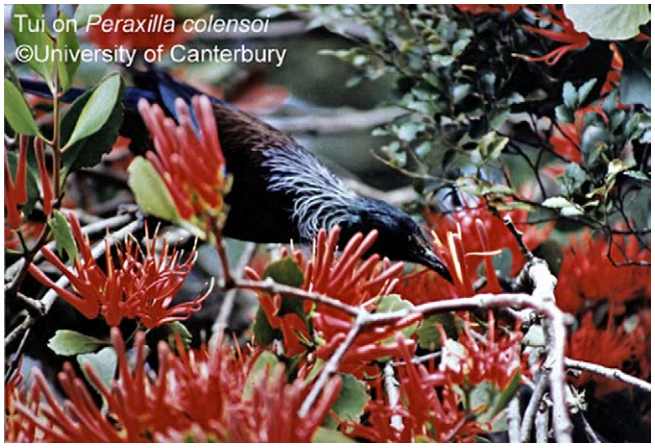
The tendril of **kohia** (*Passiflora tetrandra*) is thought to be a modified inflorescence.

Flower size and colour

The size and colour of flowers are important for plant identification. Flower size is usually measured across the petals at the longest dimension. Flower colour is the colour of the petal arrangement or inflorescence including petals and sepals.

Pollination

Pollination is the sexual reproduction process in seed-producing plants whereby pollen (male gamete, equivalent to sperm in animals) is transferred from staminate cone (male or pollen cone in conifers) or stamens (in flowers) to a stigma (in flowers) or ovulate cone (female cone in conifers). There are a number of agents used to transfer pollen, including the wind, birds and bats and other animals such as insects. If pollination is successful, fertilisation occurs and a seed develops.



Left: A tui pollinating *Peraxilla colensoi*. Photo: © University of Canterbury. Right: Short-tailed bat—a pollinator of *Dactylanthus taylorii* (Pue o te Reinga). Photo: J.L. Kendrick; © Department of Conservation.

Essentially there are two types of pollination:

Self pollination

Pollen transferred from anther to stigma on same plant. This is common in legumes and orchids.

Cross pollination

Pollen is transferred from an anther of one plant to a stigma of another. This is the most common form of pollination and occurs in several ways. Some New Zealand examples include:

- Birds—mainly red flowers
- Bees—mainly blue flowers
- Moths—small white flowers, evening scented
- Flies—white flowers
- Wind—grasses, rushes, conifers, coprosmas, beeches