

TREES FOR BEES CORNER

STAR PERFORMERS PART 14: FLOWERING QUINCES FOR LATE WINTER AND EARLY SPRING



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Trees for Bees has produced a series of fact sheets showcasing the 'best of the best' bee plants that will maximise nutritional benefits for your bees. In this issue of the journal, the team explains why the flowering quince is a 'star performer'. For more information, see www.treesforbeesnz.org.

The flowering quince, *Chaenomeles* spp., has highly attractive flowers that bees love.

The flowering quince (*Chaenomeles* spp.) is a great star performer because it flowers abundantly for a long time in late winter to early spring—when little else is flowering. At this time of year, the flowers are so attractive that bees fly straight to them even when the shrubs are being planted! Angus McPherson was surprised by how many bees started visiting the bright red flowers of a shrub he was in the middle of planting in a Canterbury demonstration farm (Figure 1). Even when a small isolated shrub is tucked away in a shady spot in the margin of a forest gap, we have

Figure 1. Honey bee visiting flowers of Japanese quince (*Chaenomeles japonica*) while the shrub is being planted on a Canterbury demonstration farm. Photo: Angus McPherson.



seen numerous bees visiting; for example, the white-flowered *Chaenomeles* shrub at Eastwoodhill National Arboretum (Figure 2). It is unusual to see bees buzzing around such a small shrub in an isolated spot. This is a super-attractive bee plant!

Chaenomeles shrubs are widely used as an ornamental plant in landscape horticulture much more than they are used as a fruit crop. Nurseries often call them '**flowering quince**' because it contrasts with the true quince (*Cydonia oblonga*), which is prized for its edible fruit. Yet, all quinces, including the false quince (*Pseudocydonia sinensis*), are flowering quinces, so this name is not helpful (see Table 1). The other common name, '**japonica**', is not useful either because the famous Japanese

quince, *Chaenomeles japonica*, is usually called japonica, but japonica also refers to *Chaenomeles speciosa* and to other flowering genera with japonica in their name, such as in the genera *Camellia* and *Pieris*. In addition, the common name Chinese quince is used for different plant genera and species (see Table 1).

When confusion over common names persist, they can be remedied by adopting the botanical name. For this reason, many nurseries, horticulturists, and scientists are now using the botanical name, **Chaenomeles**, as the common name. You can pronounce it in several different ways: for example, Kee-NOM-uh-leez or Chay-NOM uh-leez.

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Figure 2. Shrub of a white-flowered *Chaenomeles* species at the margin of a gap in the Eastwoodhill National Arboretum, Gisborne. Photo: Jean-Noël Galliot © Trees for Bees NZ.





Figure 3. Honey bee collecting pollen at the tip of a *Chaenomeles* flower bud just opening up. The green cup-like structure at the base of the flower is the hypanthium. Photo: Jean-Noël Galliot © Trees for Bees NZ.

Chaenomeles is related to apples, pears, and the true and false quinces in the Maloideae sub-family of the rose family (Rosaceae). Taxonomic confusion over the sub-family groups, genera and species has persisted throughout the history of *Chaenomeles* and its close relatives (Rumpunen, 2002; Argiropoulos, Spanakis & Rhizopoulou, 2017; Vinogradova, Riabchenko, Gorbunov, Grygorieva, & Brindza, 2018). It is inefficient for nurseries to wade through controversies over plant name updates, so they often present any of the quinces under an older unfamiliar name. However, you can look up older alternative names and synonyms when you need to translate the name you are using to names that the nursery may be using. Synonyms for plant species are listed at <http://www.theplantlist.org> and <http://www.worldfloraonline.org>

It is very important not to confuse *Chaenomeles* with the two related but different quinces that were once included in *Chaenomeles* but have since been taken out of the genus and renamed as *Cydonia oblonga*, the edible or true quince; and an intermediate species *Pseudocydonia sinensis*, the Chinese or false quince (Table 1).

Table 1. List of plants called quinces: *Chaenomeles* species and two related genera.

	Genus	Species	Common Name	Distribution
1	<i>Chaenomeles</i>	<i>japonica</i> (Thunb.) Lindl. Ex Spach	Japanese flowering quince or dwarf Japanese quince or Japanese quince or japonica or Maule's quince	Endemic to Japan Cultivated worldwide including in NZ but not naturalised in NZ
2	<i>Chaenomeles</i>	<i>speciosa</i> (Sweet) Nakai	"flowering quince or japonica"	Cultivated worldwide including in NZ. Origin China (centre in Yunnan and Tibet) Fully naturalised in NZ
3	<i>Chaenomeles</i>	<i>cathayensis</i> (Hemsl.) Schneid.	Chinese quince	Native to China, Bhutan and Burma
4	<i>Chaenomeles</i>	<i>thibetica</i> Yü	Tibetan quince	Native to China (centre Yunnan and Tibet)
Related genera also called quinces				
1	<i>Cydonia</i>	<i>oblonga</i> Mill.	quince or edible quince or true quince	Edible quince cultivated worldwide. Native to western Asia and originated in the Trans-Caucasus region
2	<i>Pseudocydonia</i>	<i>sinensis</i> (Thouin) C.K. Schneid.	"Chinese quince or flowering quince or false quince"	Native to China

Sources: Bartish et al., 2000; Rumpunen, 2002; Postman, 2009; Vinogradova et al., 2018; Manaaki Whenua – Landcare Research Databases. Ngā Tipu o Aotearoa – New Zealand Plants, 2020.

Four species are recognised in the genus *Chaenomeles* as well as several stable and widely used hybrids (Table 1). Over 500 cultivars have been developed over the last 400 years in China, Japan and elsewhere (Rumpunen, 2002). Two species, *C. japonica* (cultivated only) and *C. speciosa* (fully naturalised) are found in New Zealand (Manaaki Whenua – Landcare Research Databases, 2020).

When buying *Chaenomeles* shrubs for your bees, it is important to examine the flowers that the shrub produces. Many modern hybrids and cultivars have highly modified double flowers; for example, the popular cultivars 'CAMEO', 'ORANGE-STORM', 'PINK-STORM' and 'SCARLET-STORM'. Although their flowers may be stunningly beautiful, they are freaks of nature because the stamens are replaced by modified extra petals. Such flowers have little or no pollen, and even nectar production could be reduced or eliminated during breeding. For good bee forage, only single flowers produce the most pollen, so inspecting the flowers before buying is key. Also check if the shrub is thorny as most wild-type shrubs have thorns, but cultivars have been bred by horticulturists to be nearly or completely thornless (Rumpunen, 2002). However, if you want to plant a shrub as a screen or deterrent around your apiary, then a thorny *Chaenomeles* is one option.

Flowers

Chaenomeles shrubs are mostly deciduous, giving a beautiful display of showy flowers in late winter and early spring with white, pink, brilliant orange, or nearly red flowers (Rohrer, Robertson & Phipps, 1994). The shrubs stay in bloom for a long time, from 10 to 31 days (Kaufmane & Rumpunen, 2002a, 2002b). The flowers occur in clusters of four to seven on branches two years old or older, and often cover the whole surface of the shrub.

Chaenomeles flowers are classic open-dish type flowers with five petals arranged in radial symmetry. Each flower has a deep cup-like receptacle at the base of the flower called a *hypanthium*, which is distinctive of Rosaceae flowers (Rohrer, Robertson & Phipps, 1994). The flower life cycle can last up to six days (Kaufmane & Rumpunen, 2002a, 2002b). They are 'perfect' flowers because each flower has both male parts (stamens with filaments bearing anthers) and female parts (pistils with styles bearing five-lobed stigmas). That means each flower delivers both pollen and nectar.

Sometimes, a portion of flowers (at times up to 94%) on a shrub can have pistils that are stunted or defective (Kaufmane & Rumpunen, 2002a, 2002b). These flowers are then 'imperfect' and functionally male flowers; they do not produce seeds or fruit. Most cultivars are self-incompatible, which means that the flowers must be cross-pollinated and a nearby polliniser species will be needed if fruit is desired (Kaufmane & Rumpunen, 2002a, 2002b).

Pollen

Chaenomeles shrubs are excellent pollen providers for bees. Bees can forage efficiently because the open-dish flowers are in clusters and the amount of pollen per flower is plentiful. The pollen starts ripening two to three days before flower buds have opened (Kaufmane & Rumpunen, 2002a, 2002b), so it is common to see bees collecting pollen at the tip of partly opened buds (Figure 3). The numerous stamens, from 30 to 60, are arranged in two circles and have anthers that open sequentially over the life cycle of the flower, delivering fresh pollen continuously (Figure 4). The pollen has a high level of crude protein at 24% (unpublished data, Trees for Bees NZ), which is like that of apples and pears.

Nectar

Nectar is produced on the inner sides and bottom floor of the hypanthium, the cup-like receptacle at the base of the flower (Figure 5).

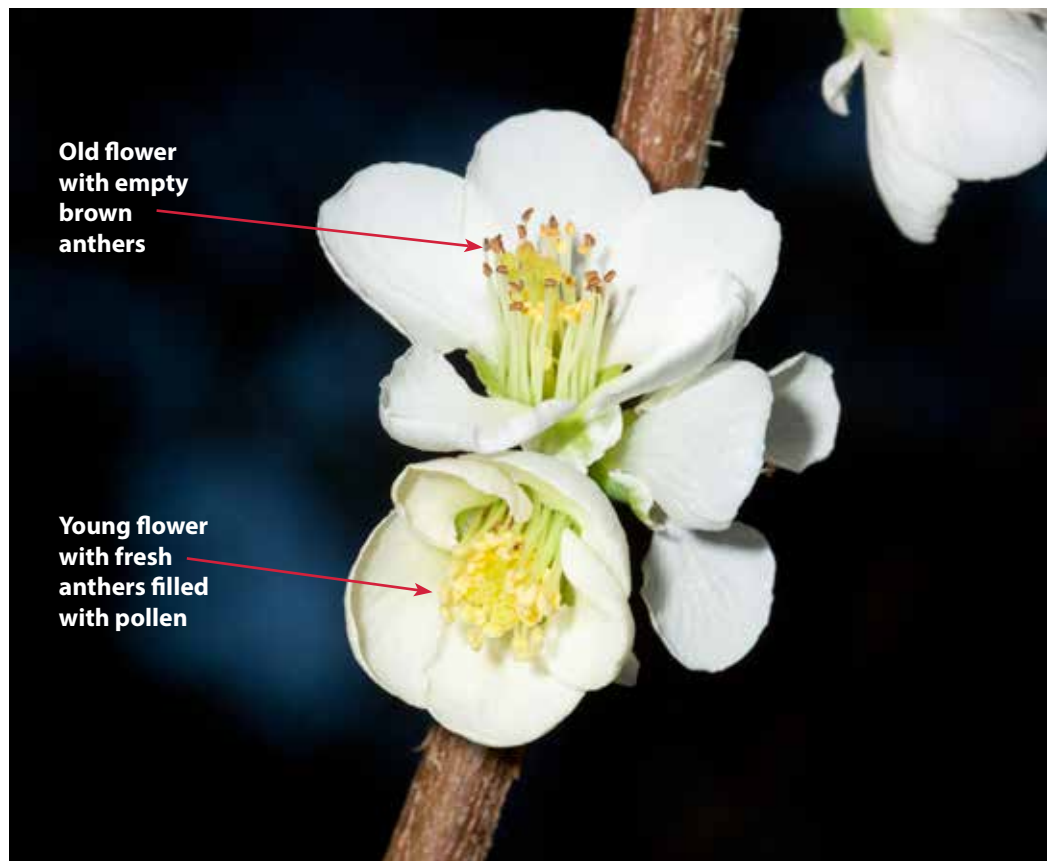


Figure 4. *Chaenomeles* flowers in two stages of the life cycle. The top flower is an older flower with brown, empty anthers and only a few young yellow anthers and yellow pollen. The bottom flower is a younger flower with yellow anthers freshly opened to present pollen or still closed prior to opening. Photo: Jean-Noël Galliot © Trees for Bees NZ.

The cup is lined by nectariferous tissue which exudes nectar through pores (Rohrer et al., 1994). Nectar production in the flowers of *C. japonica* and *C. speciosa* was investigated in Poland (Weryszko-Chmielewska, Masierowska, & Konarska 1997). *C. speciosa* secreted more nectar (with 50 mg per 10 flowers), and higher sugar concentration (39% sugar) than *C. japonica*, with 25 mg per 10 flowers and 34% sugar concentration. If nectar is your top priority over pollen, you could select *C. speciosa* over *C. japonica*, although genotype and environmental factors will greatly influence nectar secretion. In any case, both species have good sugar concentration, which is what makes them so attractive to bees.

Multiple uses

Chaenomeles shrubs in New Zealand are mainly used as ornamental plants for their beautiful flowers (Figure 6), although it is recognised that some species and cultivars produce edible fruit. In recent times, *C. japonica* has been established as a minor fruit crop in northern Europe with an ongoing breeding and domestication programme in Latvia, Lithuania, Sweden, and Finland (Rumpunen, 2002; Kviklys, Ruisa, & Rumpunen, 2003). *C. speciosa* is prized as a traditional

medicinal plant in Central and Southern China (Bartish, Garkava, Rumpunen, & Nybom, 2000).

Raw *Chaenomeles* fruits are reported to be harsh and acidic, but fragrant when cooked (Plants for the Future, 2020). The fruits, though edible, must be processed before eating because they are "hard as rocks and sour as lemons" (Pearce & Thieret, 1991). While the fruits are fragrant when they ripen, they do not soften so they must be processed before consumption (Rumpunen, 2002). Their rich juice, aroma and flavour, dietary fibre, high pectin content and excellent nutritional benefits make these fruits ideal for processing into jams, jellies, fruit pies, liqueurs, etc. (Rumpunen, 2002).

Planting advice

Chaenomeles shrubs have been used in a variety of situations on Trees for Bees Demonstration farms, including in hedgerows and shelterbelts as well as for screening and early spring bee forage around apiary sites. These plants can sucker freely, so they can also be used for ground cover. Because of fire blight issues we do not plant *Chaenomeles* near pipfruit or stonefruit orchards (Bell, Rainey, Eaker, & Sutton, 2005).

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Figure 5. Honey bee taking nectar from a *Chaenomeles* flower. The green cup-like structure at the base of the flower, called the *hypanthium*, is where the nectar is produced and can accumulate. Photo: Jean-Noël Galliot © Trees for Bees NZ.

Chaenomeles can be established in a variety of soils including light, medium and heavy soils that are acid, neutral or alkaline (Plants for the Future, 2020) but it prefers moist, well-drained acid mineral soils containing organic matter and some clay (Kviklys et al., 2003). Soil alkalinity and lack of organic matter can be addressed with appropriate fertiliser and mulch.

The plants are hardy but can be susceptible to extreme spring frosts, although their long flowering period reduces the risk of significant frost damage to flowers. While they prefer moist soil, their wide and deep root system also means they can tolerate dry conditions and are suitable for preventing soil erosion.

Weed control is especially important for *Chaenomeles* shrubs. This can be achieved by clearing grass around the planting spot before or at the time of planting (mechanical or pre-plant spot spray). Grass control can be maintained by using a mulch or a follow-up spot spray if required.

Plants can be installed from autumn through to early spring, although mid-winter should be avoided if very cold weather is likely.

The Japanese quince, *C. japonica* is a dwarf shrub up to 1 m high and 1.8 m wide, while *C. speciosa* grows up to 3 m high and wide (Gardenia, 2020). Therefore, plant spacing will vary depending on whether you wish to plant them as shrubs under taller tree cover, as part of a shelterbelt, screen, or hedgerow, or even as an orchard.

Typically, we establish smaller shrubs at 1.5–2 m spacing and larger shrubs at around 3–5 m spacing to maximise the surface flowering area. Small shrubs may require a spray sleeve with bamboo stakes to protect them from any spray and from rabbits. Larger 'standard' grade plants will require a taller stake to stabilise them.

Figure 6: Close up of *Chaenomeles* flower.



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