TREES FOR BEES CORNER

STAR PERFORMERS PART 1: INTRODUCTION TO THE SERIES AND PIPFRUITS

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Trees for Bees has produced a new series of fact sheets showcasing the 'best of the best' bee plants that will maximise nutrition benefits for your bees. In this issue of the journal, the team introduces the series and explains why pipfruit trees are a 'star performer'. For more information, see www.treesforbeesnz.org.

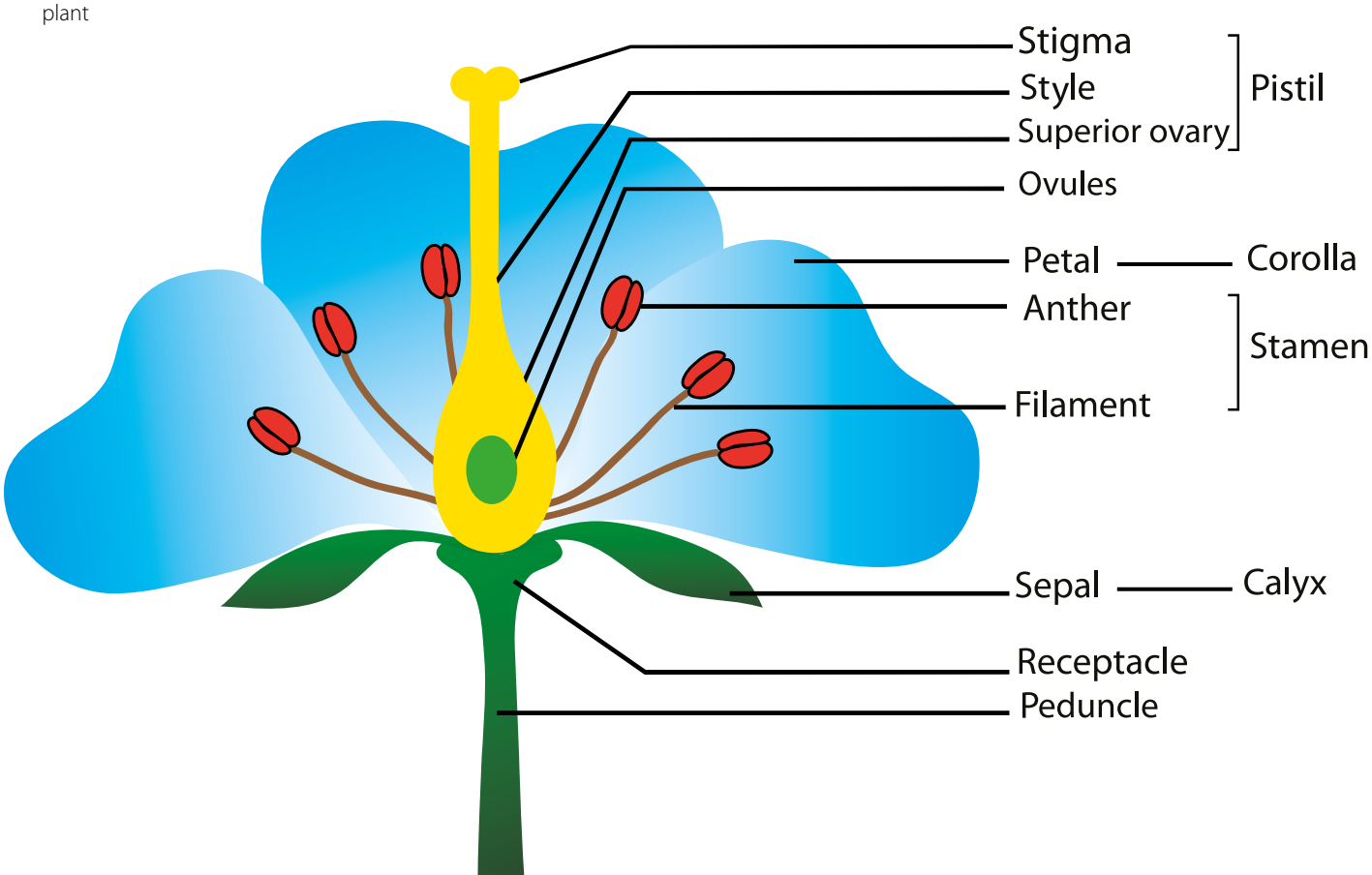
Introduction to the Series

The 'Star Performers' series is designed to show the best of the best in bee plants. Each selected plant group has been investigated in the field by our team and used extensively in our Demo Farms.

These plants rank as star performers because they maximise bee nutrition by having any combination of one or more of these six great features:

1. the plant flowers at a time of pollen or nectar dearth (e.g., spring, autumn and even winter)
2. the plant flowers profusely with high density and large quantity of flowers per plant
3. each flower delivers large quantities of pollen or nectar; even though such plants may have few flowers
4. the flowers deliver high quality pollen nutrition (e.g., high crude protein content)
5. the flowers give bees easy access to pollen and nectar for better foraging efficiency
6. the flowers are highly attractive and preferred by bees.

We focus on the nature of the flower in relation to the bee's ease of access to the pollen and/or nectar, so it is helpful to understand flower structure to see how bees are able to 'work the flower'. A flower is arranged in concentric circles, with the pistil in the centre surrounded by one or more whorls of stamens bearing pollen, then whorls of petals and then sepals. Any of these parts may be modified or absent as in unisexual flowers. The nectary (where the nectar is produced) can be anywhere—at the base of the pistil or stamens, on the petals, or even outside the flower. The nectary may be an obvious structure or inconspicuous and subtle. It is absent in flowers that produce only pollen and no nectar. The names of the flower parts are illustrated in the figure below.



Parts of a flower, starting from the centre and working to the outside of the flower:

Pistil – the female reproductive organ located in the centre, made up of the stigma, style and ovary

Stigma – the receptive surface of the pistil where pollen lands and germinates to produce the pollen tube

Style – the narrow elongated part of the pistil between the ovary and the stigma; guides the pollen tube to the ovary

Ovary – the enlarged basal portion of the pistil where ovules are produced and protected

Ovule – the egg awaiting fertilisation from genetic material delivered in pollen tube; may be one or many ovules per ovary

Stamens – the male reproductive organs surrounding the pistil, made up of the anther and filament

Anther – the sac at the tip of the stamen; produces and protects pollen; on maturity it opens to expose the pollen

Filament – the stalk that holds up the anther to promote pollen dispersal by wind or pollinators

Petals – the parts surrounding the pistil and stamen to protect them and to attract pollinators; may be absent

Corolla – the whorl of all the petals together, petals can be separated individually or fused to form a tube

Receptacle –the axis (upper part of the stem) to which the floral parts are attached.

Sepals – the outermost whorl protects flower bud, usually green and leaf-like, sometimes coloured; may be absent

Calyx – the whorl of all the sepals taken together

Peduncle – stalk holding up one flower or a group of flowers; called a pedicel for one flower on a stalk of multiple flowers.

PIPFRUIT TREES IN THE ROSE FAMILY

In the Rose family, the pipfruit trees, (e.g., pears, apples, crab apples, and quinces) are Star Performers because of their massive flower density on the tree and the high protein content in the pollen (22%–28%). The trees or shrubs are usually deciduous with flowers opening before the leaves. Most species flower in spring with different early and late varieties.

In each group there are both edible cultivars and ornamental inedible varieties. For example, the 'flowering quince' *(Chaenomeles japonica)* is grown ornamentally for the flowers, not for their fruits (although they are edible), while the closely related *Cydonia oblonga* and *Pseudocydonia sinensis* are the edible quinces. There are both edible and ornamental cultivars of apples, pears and crab apples too. Consult your local nursery. Avoid any that have double flowers or other modifications that reduce the quantity and presentation of pollen and nectar. If the spread of weeds by bird dispersal of fruits and seeds is an issue, then choose cultivars with large fruits that don't attract birds.

PIPFRUIT TREES IN THE ROSE FAMILY

COMMON NAME	SPECIES
Domestic apple	*Malus domestica* cultivars
Crab apple	*Malus species*
European pear	*Pyrus communis* cultivars
Ornamental pear	e.g., *Pyrus calleryana, P. ussuriensis, P. nivalis, P. betulaefolia*
Edible quince	*Cydonia oblonga cultivars,* e.g., Smyrna
False quince	*Pseudocydonia sinensis*
Flowering quince	*Chaenomeles species,* e.g., *C. japonica* (Japanese flowering quince), *C. cathayensis* (Chinese quince)

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This heritage pear tree in full bloom benefits bees hugely. Photo: Jean-Noël Galliot © Trees for Bees NZ.

Pear flower with bee collecting pollen. Anthers in all stages of opening deliver pollen throughout the day. Photo: Jean-Noël Galliot © Trees for Bees NZ.

Pear flower with bee taking nectar. The bee 'tongue' (proboscis) is extended into the centre of the flower for sipping nectar. Photo: Jean-Noël Galliot © Trees for Bees NZ.

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Pollen

In the common edible pear *(Pyrus communis)* the anthers open sequentially to present pollen all day long, so you will see bees buzzing in the flowers gathering pollen at any time of day. The high density of flowers plus the numerous whorls of stamens in each flower add up to generous quantities of pollen per tree.

Nectar

Pear flowers have the classic 'open dish' shape with nectar produced by the nectary, which is located in the centre of the flower in the space at the base of the pistil. The nectary is surrounded by whorls of numerous stamens—the epitome of easy access. The other pipfruit species (apples, crab apples, edible quinces and flowering quinces) have almost identical flowers with the open dish style allowing easy access to nectar.

Planting advice

Pipfruit species are used in a variety of situations on Trees for Bees demonstration farms, from orchards to shelterbelts to paddock shade and shelter. They are flexible in that they can be managed for fruit production, or left to be more ornamental. Growers will need to be careful when planting near existing orchards that they don't introduce pest and disease problems, and to check that the species aren't included in any noxious plant lists. Pipfruit are most commonly used for on-farm orchards, where a mixture of fruit species provides not only a variety of fruit for consumption, but also pollen at flowering times from early to late spring.

Pipfruit species can also be incorporated into shelterbelts, where the windward species are evergreen bee feed (e.g., some *Michelia, Camellia* and Laurel species) to provide low shelter, with the pipfruit blossom species planted on the leeward side and ideally facing the sun. If you have enough space (i.e., more than five to six metres of shelterbelt width), you can also include tree species for high shelter. In this case, fastigiate form trees of *Quercus robur, Liriodendron tulipifera,* some *Fraxinus* species, and *Alnus cordata* are particularly useful.

In addition to shelterbelts, larger species of pipfruit trees can make suitable paddock shade specimens when protected with a tree guard. You can also turn this into a small copse of trees by enlarging the tree guard and including a mix of smaller shrub species (e.g., crab apples).

FOCUS GROUP REPORTS: RESEARCH

VARROA CONTROL RESEARCH: BRIEF UPDATE

Claire Hall, Mark Goodwin, David Pattemore, ApiNZ Research Focus Group

Over the last couple of months, we have reported on your priorities and ideas for approaches to varroa control research. Based on these suggestions, we submitted a Ministry for Primary Industries (MPI) Sustainable Farming Fund (SFF) funding proposal to develop the priority components of a varroa IPM programme. We received pledges of support from over 60 individuals and organisations—thank you! If successful, the programme will start in July 2017 and we will update you early next year.

We have been seeking more information and ideas through a SurveyMonkey questionnaire. The response has been very low, so we are unable to provide a summary in this issue. We know that as busy beekeepers, it's not always easy finding time for questionnaires. So we have planned through ApiNZ a whole range of different co-innovation and extension activities as part of the SFF that we hope will work for you, including workshops, field days, articles, videos and podcasts.

By now most of you will have started treating colonies for varroa or are about to treat. Many beekeepers in the north of the North Island, and possibly elsewhere, have found it important to check varroa levels in hives when the treatments are removed, as there have been increasing problems with varroa developing resistance to the chemicals we use to control them. The best way to test varroa levels is to use the sugar shake method. When carrying out a sugar shake, make sure the icing sugar has not absorbed moisture and become lumpy, and remember to shake very, very hard.

We don't have good post-treatment varroa thresholds that we can provide at this stage. It is hopeful that the SFF programme will provide these. However, as a best guess, if you find more than 10 varroa mites in a sugar shake after the spring treatment, you will need to either treat again in the spring or at least aim to treat early in the autumn.