TREES FOR BEES CORNER

# SHOW ME THE MONEY TREE

*Dr Angus McPherson (Trees for Bees Farm Planting Adviser) and Dr Linda Newstrom-Lloyd (Trees for Bees Botanist)*

Planting for bees is like planting a money tree. Every time you or your landowner plant good bee forage, you are winning in three major ways.

The three ways that beekeepers win by encouraging landowners to plant bee forage include money, apiary performance, and bee health. First, beekeepers save on production costs, travel and labour that would have been spent on supplementary feeding. Second, beekeepers can expand the flowering seasons and increase the hive carrying capacity at an apiary site. Third, beekeepers can improve bee health with a greater diversity and quantity of pollen and nectar, which leads to fewer pest and disease problems. The number of trees or shrubs needed to achieve these wins can be surprisingly few.

Our work with beekeepers and landowners on 32 demonstration farms over the past 10 years has shown that landowners are more than willing to participate in planting good bee forage. They are motivated to establish bee forage when it is integrated into their ongoing planting plans to improve farm operations or utilise unproductive land. They know that helping bees is helping themselves and the New Zealand economy. The information exchange and mutual assistance improves the beekeeper–landowner working relationship as important business partners.

## How to engage landowners to plant bee forage

We have developed a system of planting bee forage that fosters excellent relationships between beekeepers and landowners. The key to success in our system is that we do not require landowners to set aside land just for bee plants. Instead, the system integrates multi-function bee plants into ongoing planting that the landowner has already planned for other purposes.

Many landowners are happy to incorporate bee forage into the mix at their own cost if they know what to plant. For example, see Figure 1, which comes from the *Riparian Planting Handbook* (McPherson and Newstrom-Lloyd, 2019).

*Figure 1. Fenced Trees for Bees riparian planting after two years at Ingleby NZ's Puketiti Station, King Country. Photo ©Hans Henrik Koefoed, Ingleby Farms and Forests.*

Hence, landowners usually pay for the bee plants and planting costs because it benefits their own operations as well as the bees. In some situations, cost-sharing partnerships are set up if it is worthwhile for a beekeeper to help pay for plants (or to contribute labour) for bee plantations that specifically benefit their apiaries. In the case of a beekeeper owning land for a home yard or other purposes, then single-function bee plants can also be included. Step by step, year by year, more beekeeper–landowner partnerships are engaged in planting bee forage for the benefit of both businesses.

## What is the payback on investment?

The payback on investment in bee forage plantations is significant and increases steadily over time. This is due not only to the exponential increase in the volume of pollen and nectar produced as plants mature and grow in size, but it is also due to labour, travel and cost savings from reducing or eliminating the need for feeding protein patties and sugar syrup.

Cost savings also arise as the bees are healthier and have more stored pollen and nectar to survive prolonged periods of bad weather, thus eliminating trips for emergency feeding at the site. If there is bad weather, the bees have the stores on board so nurse bees will not cannibalise the larvae, therefore preventing bee population crashes. A further cash benefit is that healthier bees result in reduced treatment costs for pest and disease control, reduced demand for hive replacements, and improved hive productivity. The three Trees for Bees case studies of demonstration farms described later in this article provide evidence that the return on investment is considerable, and it increases even in the first five years after planting bee forage.

## Better bee health

Plenty of good bee forage leads to better bee health and fewer pest and disease problems. While it can be tempting to rely on supplementary bee feed, a diversity and

*Figure 2. California lilac* (Ceanothus roweanus) *has a massive display of brilliant blue flowers with protein-rich pollen ranging from 29% to 39% at the Kahikatea Farm nursery in Hawke's Bay. It is used for quick flowering as low shelter and as a shrub layer amongst larger trees. Photo by Linda Newstrom-Lloyd ©Trees for Bees.*

abundance of fresh natural pollen has been shown to be central to bee health, immune response and colony growth (Black, 2006; Brodschneider & Crailsheim, 2010; DeGrandi-Hoffman et al., 2015; Di Pasquale et al., 2013; Mao, et al. 2013).

The current apiary overstocking problems, especially the intense competitive pressure on spring build-up and overwintering sites, has made bee nutrition an urgent issue in many regions. This problem is compounded by the continued removal of bee floral resources without replacement. For beekeepers, the best long-term defence is to take steps to encourage the installation of a supply of fresh, natural pollen and nectar close to their apiaries. By partnering with landowners to gradually establish superior bee forage plants, the pollen and nectar dearth gaps can be filled and the annual bee forage budget can be designed to serve the goals of both the beekeeper and the landowner.

Some examples of superior bee forage include plants with very high protein content in the pollen, such as California lilac (*Ceanothus roweanus;* up to 39%; Figure 2) and Seibold's crab apple (*Malus seiboldii;* up to 39%; Figure 3) or very attractive nectar, such as Thorny locust (*Gleditsia tricanthos;* Figure 4). According to the beekeepers we have worked with on our demonstration farms, the improved bee health from planting good bee forage is remarkable.

## Case studies showing benefits and cost savings

Our work on demonstration farms shows clearly that it is worth the relatively small investment to get great results. For the past six years we have observed continual

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*Figure 3. Crab apple* (Malus seiboldii) *has excellent pollen with up to 39% protein. It is used in shelterbelts, riparian planting, and for amenity. Photo: Jean-Nöel Galliot ©Trees for Bees NZ.*

improvement in bee health and colony numbers on our demonstration farms. Here we provide evidence and feedback from three case studies. These examples show that establishing a diversity and abundance of bee forage for fresh pollen and nectar at apiary sites is the most cost-effective long-term strategy to improve apiary performance.

## Case study 1: A beekeeper–landowner partnership

This beekeeper has been proactive in working in partnerships with landowners to plant bee forage. The beekeeper calculated their average supplementary feed costs at $90/hive, including materials, travel costs, and labour. For 120 hives this is just over $10,000 per annum, and so they budget 10% of their supplementary feed cost for bee forage planting across five overwintering sites ($1,000/year). One of these sites holds 24 hives and lacked early spring pollen, meaning a late start for hives coming out of winter, which set bees back for honey harvesting and pollination services.

In 2014/15, tagasaste, willows and fruit trees were established in partnership between the farmer and beekeeper, with the beekeeper's share of the investment in trees and planting at $1,500 over two years. The installed bee forage was flowering by 2015/16, extending the flowering season, and by 2018 the beekeeper had no further need to feed protein patties and was seeing reduced demand for sugar feeding, halving the number of site visits required. This significantly reduced supplementary feeding costs at this apiary site by $48/hive/year in materials, travel costs and labour. These savings come to $1,163 per year for an apiary of 24 hives, for an initial one-off investment of $1,500, which means the investment cost is already paid back.

## Case study 2: A landowner initiative

This farmer took the initiative to plant a shelterbelt with bee forage to screen the house from road dust. This apiary site was previously unable to winter any hives because of poor bee forage in late autumn and early spring. This meant hives had to be relocated 100 km for overwintering. In the spring of 2015, the farmer established 250 bee forage plants on the land for autumn and early spring flowering, including *Michelia*, *Camellia* and *Gordonia* species for autumn through to early spring, and hawthorn and blossom species for mid-spring. Because the flowering season was thereby extended, in autumn 2018 the apiary successfully overwintered 24 hives, increasing to 32 hives in 2019. It is expected that hive carrying capacity for this apiary will continue to increase as plants grow bigger, thus producing more flowers. The beekeeper also observed that weak hives in autumn recovered well over winter to become strong hives by spring, without feeding protein patties. In addition, significant cost savings were possible because the hives didn't require relocating for overwintering.

## Case study 3: A beekeepers' initiative

In this case, the beekeepers acquired land for a home yard that was originally intended for raising queens and new nucleus colonies. Starting in 2013, the beekeepers embarked on an extensive step-by-step bee forage planting programme to support their queen and nucleus raising and to increase the carrying capacity of the home yard. Their annual planting of bee forage plants on a variety of sites included riparian planting, shelterbelts, escarpments, avenues, and paddock shade and shelter. The increase in the supply and diversity of pollen and nectar has doubled the hive carrying capacity and has resulted in markedly healthier, more productive bees. The beekeepers have also been able to increase the range of beekeeping operations at the site to include recovery of weak and sick hives, temporary holding of hives between pollination and honey work, and overwintering hives. Autumn to winter flowering has increased significantly to allow bees to store pollen ready for brood rearing starting in August, which is needed for early fruit pollination.

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*Figure 4. Thorny locust* (Gleditsia tricanthos) *has rich nectar that bees love. It is a large tree used as a specimen for paddock shade and shelter and on avenues. Photo: Jean-Nöel Galliot ©Trees for Bees NZ.*