Assessing production
Basics - Honeybees

1) Maximising flower visits
2) Maximising effectiveness
3) Minimising risk
4) Minimising cost
5) Protecting bees
Seed set (Delicious)
Pollen collectors
Maximising flower visits

Timing of Introductions

- First introduction
Maximising flower visits
Maximising flower visits

Days

Bees

Number of Days

2nd introduction
Maximising flower visits

Number of colonies
Maximising flower visits

Number of colonies
Colony strength

Total number of frames of bees and brood
Maximising flower visits

Placement in Orchards
Only small groups
Maximising flower visits

**Placement in Orchards**

Only small groups

Warm location
Maximising flower visits

Placement in Orchards
Only small groups
Warm location
Close to the crop
Efficiency

Carrying more viable pollen
Efficiency

Carrying more viable pollen
Greater stigma contact
Greater stigma contact
Greater stigma contact
Greater stigma contact
Greater stigma contact
Greater stigma contact
Greater stigma contact

![Bar chart showing pollen and nectar collectors]

- **Pollen collectors**
- **Nectar collectors**

The chart illustrates the contact points (in pollen grains) between greater stigma contact for pollen and nectar collectors.
Increasing pollen collectors

Colony makeup
Pollination unit

12 frames of bees
4 full frames of brood
25% unsealed brood
Brood in bottom super
2 frames empty comb
3 frames of honey
Young queen
Increasing pollen collectors

Sugar syrup feeding

Apples
Almonds
Beans
Cherries
White clover
Red clover
Kiwifruit
Sugar syrup feeding
How does it work

Bees collect nectar
Fed

Pollen pellets collected

The New Zealand Institute for Plant & Food Research Limited

Days

Not fed

Pollen pellets collected

Days
Sugar syrup feeding

8 am - 1pm

Inside hives

30 - 60 % syrup

2 litres every 2nd day
Feed inside hives
Pollination Contract

This agreement is made on the ____________________________ (date)

BETWEEN

(grower’s name)
hereinafter called the “grower”

and (beekeeper’s name)
hereinafter called the “beekeeper”

TERM OF AGREEMENT

The term of this agreement shall be for the 20_____ growing season, covering flowering until 48 hours after the grower requests hive removal, but not beyond 31 December of that year. (Other agreed provisions should be added or deleted if required at the time of signing, and initialled by both parties)
1. To supply hives each containing a minimum of (higher standards may be negotiated, especially on isolated or problem orchards):

   a) four full standard frames of brood in all stages (7000cm$^2$ of brood, 7 frames 60% full).
   b) twelve standard frames well covered with bees (approximately 30,000 bees)
   c) at least three full depth frames of honey
   d) a good laying queen
   e) sufficient room for colony expansion
   f) be free of American Foul Brood disease (**Bacillus** larvae), and
   g) have been treated for Varroa for at least four weeks prior to being introduced to the orchard.

2. To deliver each instalment of hives to the orchard within 24 hours of final notice from the grower under Section B, clause 10.

3. To place hives in positions decided in previous consultation with the grower in group sizes of no more than hives.

4. To feed each colony litres of % sugar syrup solution every second morning starting on the second day colonies are in the orchard.

5. To not place/spill sugar syrup outside the hives where it can be collected by foraging bees.

6. a) Within 24 hours of notice from the grower to open and demonstrate bee colony strength of any hives specified by the grower.
   b) To lend grower and/or auditor effective protective clothing if requested where they wish to accompany the beekeeper under 7 a), or under 7 c).
   c) To allow an auditor nominated by the grower to audit the strength of the colonies if requested by the grower (such request not to be made unreasonably).

7. To supply within 24 hours an additional hive(s) to compensate for any hive found to be below the minimum standard, at no extra cost to the grower.

8. To remove the hives within 48 hours of being notified by the grower that they are no longer required.

9. To take all reasonable measures to reduce the number of field bees left behind in the grower's orchard(s) when hives are removed.
1. To supply hives each containing a minimum of (higher standards may be negotiated, especially on isolated or problem orchards):
   a) four full standard frames of brood in all stages (7000 cm² of brood, 7 frames 60% full).
   b) twelve standard frames well covered with bees (approximately 30,000 bees).
   c) at least three full depth frames of honey.
   d) a good laying queen.
   e) sufficient room for colony expansion such hives to be free of American Foul Brood disease (Bacillus larvae), and
   f) have been treated for Varroa for at least four weeks prior to being introduced to the orchard.

2. To deliver each instalment of hives to the orchard within 24 hours of final notice from the grower under Section B, clause 10.

3. To place hives in positions decided in previous consultation with the grower in group sizes of no more than ______ hives.

4. To feed each colony _____ litres of _____ % sugar syrup solution every second morning starting on the second day colonies are in the orchard.

5. To not place/spill sugar syrup outside the hives where it can be collected by foraging bees.
6. a) Within 24 hours of notice from the grower to open and demonstrate bee colony strength of any hives specified by the grower.

   b) To lend grower and/or auditor effective protective clothing if requested where they wish to accompany the beekeeper under 7 a), or under 7 c).

   c) To allow an auditor nominated by the grower to audit the strength of the colonies if requested by the grower (such request not to be made unreasonably).

7. To supply within 24 hours an additional hive(s) to compensate for any hive found to be below the minimum standard, at no extra cost to the grower.

8. To remove the hives within 48 hours of being notified by the grower that they are no longer required.

9. To take all reasonable measures to reduce the number of field bees left behind in the grower’s orchard(s) when hives are removed.
SECTION B: GROWER RESPONSIBILITIES

Grower Agrees:

1. To pay a rental sum of $__________ NZD per hive for a total of _________ hives. GST is to be added to all payments.

2. The total rental is $__________ NZD. This is payable as to $__________ NZD on or by (date) and a final payment of $__________ NZD by the 20th of the month following removal of hives from the orchard.

3. To pay 1.5% per month (or part thereof) interest on amounts unpaid after due dates.
1. To give the beekeeper at least 48 hours first notice and 24 hours final notice that hives are required to be placed in the orchard.

2. Not to shift, examine, or disrupt bee access to or from hives without the beekeeper’s approval.

3. To give beekeeper at least 48 hours notice to remove hives from orchard.
1. To comply with bee toxicity warnings on agrichemical labels.

2. Not to spray any bee-toxic chemical while the hives are in the orchard, and in so far as is reasonably practicable, to avoid spraying any insecticide in the ten days prior to hives being shifted into the orchard.

3. To avoid spraying any agrichemical when large numbers of bees are foraging, in so far as is reasonably practicable.

4. To provide the beekeeper with at least 24 hours notice if anything is to be sprayed in the orchard while hives are present and to flush any insecticide or other bee-toxic chemical from tanks and spraying equipment before spraying while hives are in the orchard.

5. To dispose of any insecticide-contaminated liquid or other bee-toxic material so that bees cannot contact or drink it.
Chemicals and pollination
Chemicals and pollination

Insecticides

DEAD BEES DON’T POLLINATE
Chemicals and pollination

Insecticides
Fungicides
Chemicals and pollination

Insecticides
Fungicides
Chemicals and pollination

Insecticides
Fungicides
Surfactants
Chemicals and pollination

- Insecticides
- Fungicides
- Surfactants
- Water

Percent mortality vs. Temperature °C graph
Avoiding problems

Do spray bees  -  When bee are not foraging
  -  Mow flowers
Insecticides – Check bee toxicity
Fungicides  -  Pollen toxicity
  -  Honey bee toxicity
Water        -  Warm conditions
Summary

Managing hives for maximum flower visits

- Introductions
- Placements
- Colony numbers
- Colony strengths
- Contracts
Summary

1) Managing hives for maximum flower visits

2) Maximum efficiency of visits
   - Pollinizers
   - Colony makeup
   - Sugar syrup feeding
Summary

1) Managing hives for maximum flower visits

2) Maximum efficiency of visits

3) Chemicals
   - Insecticides
   - Fungicides
   - Surfactants
   - Water