

Best Practice pollination  
- a beekeepers perspective



Ben Hooper - Tintinara SA

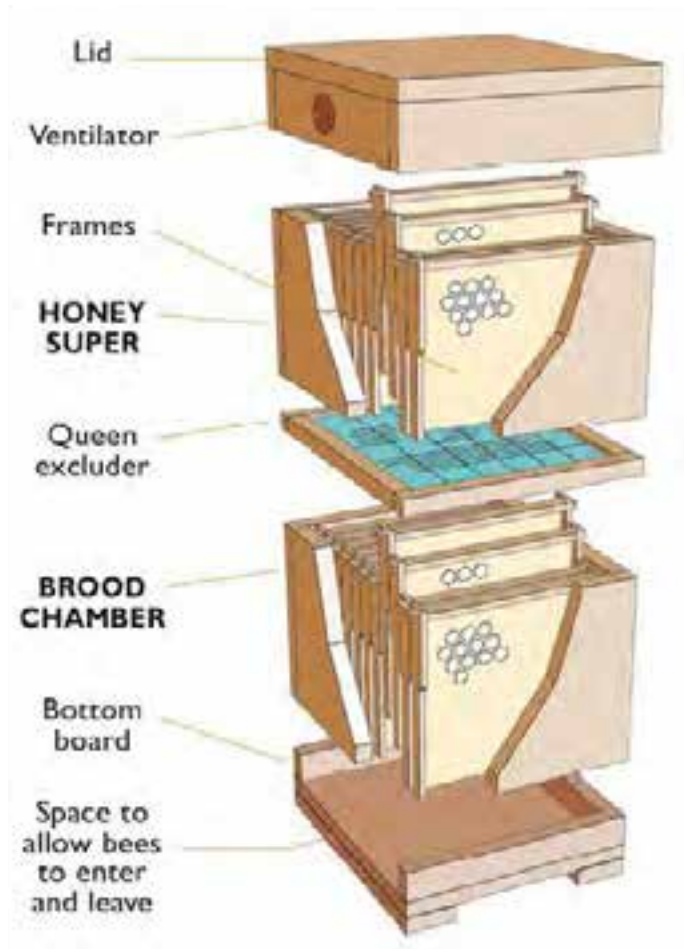
What, How & Why honey bee interact in an environment

Danny Le Furve – Ardrossan SA

The Environment and exposures that they interact in



# Best Practice pollination - a beekeepers perspective

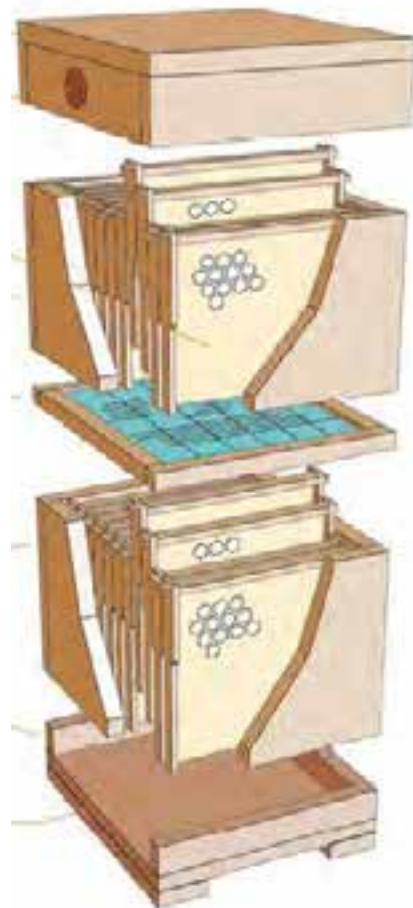


## Bee Basics

### Why all the same?

- Bee Space
- Commercial aspects
  - Functionality
  - Storage
  - Transport

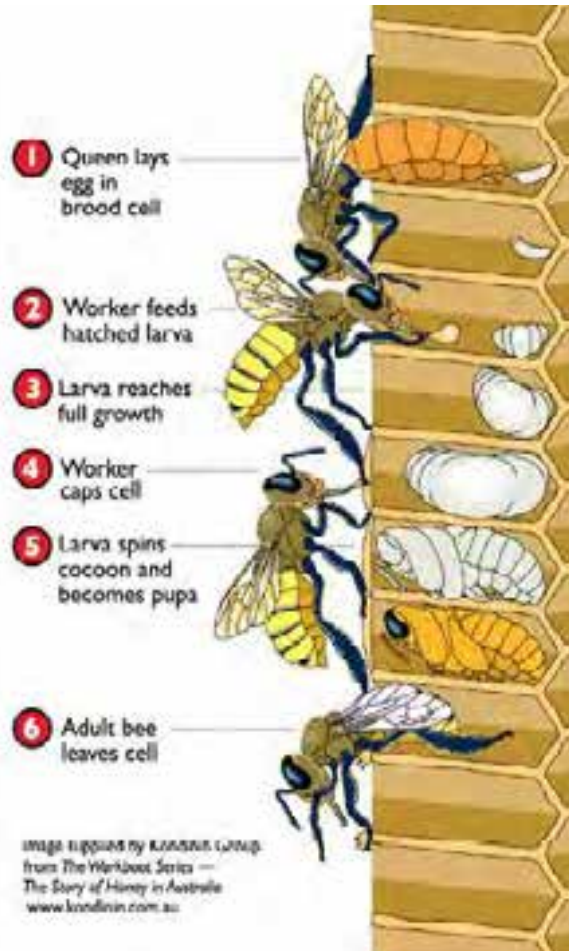
## Best Practice pollination - a beekeepers perspective



## Average Adult Honey bees numbers Hive strength fluctuations

- Winter – 20,000 +
- Spring – 40,000 > 60,000 +
- Summer - 40,000 > 60,000
- Autumn – 25,000 > 40,000

# Best Practice pollination - a beekeepers perspective



## Total Hive population

- additional 35% of immature bees
- Commonly called brood
- Consisting of Eggs, larvae and pupae
- The presence of brood is the major stimulant for nutrient collection/foraging.

# Best Practice pollination - a beekeepers perspective



Commercial Apiarists Income

Honey + Pollination

More bees = Better



# Best Practice pollination - a beekeepers perspective

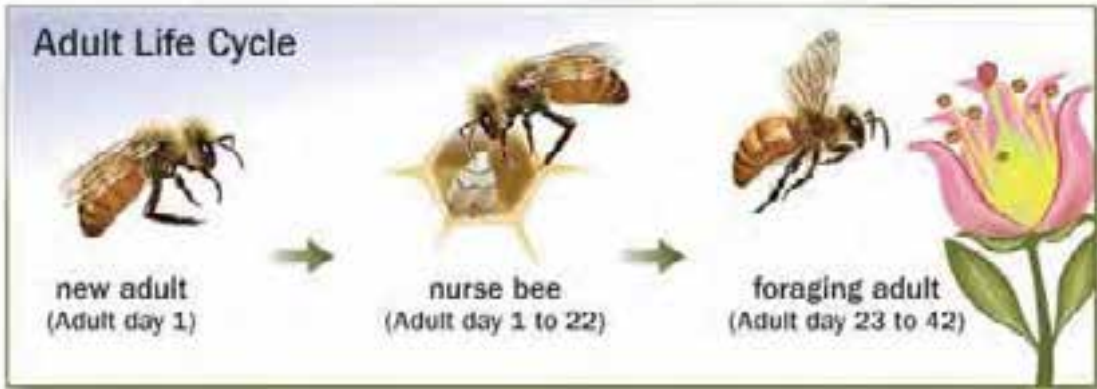
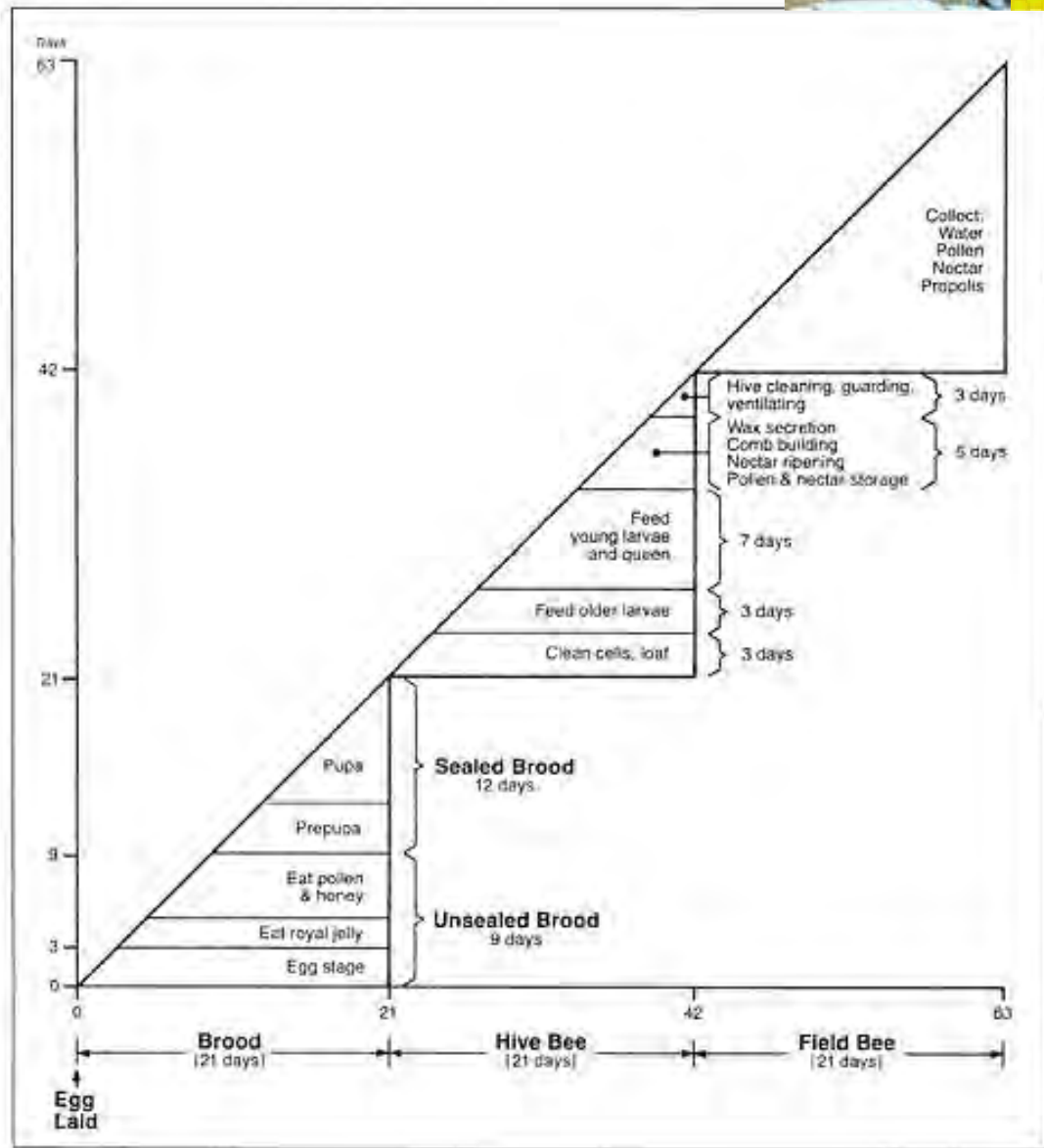


Illustration: Megartha Meyer

# Best Practice pollination - a beekeepers perspective



## Best Practice pollination - a beekeepers perspective



### Queen Importance

- Nutrient demand is primarily driven by the presence of brood pheromone and an inventory of available store
- Stores 2-3 million sperm
- Lay up to 2000 eggs per day
- Availability of resources







**1. Good!!!**



**2.Bad!!!**

## Best Practice pollination - a beekeepers perspective



### Main source of nutrients

Foraging Honey bees are collecting

- pollen = protein
- Nectar = carbohydrates

### Consumption

There are several distinct groups of significant nutrient consumers in the hive: the queen, the larvae, the nurses, the foragers and the drones.



## Best Practice pollination - a beekeepers perspective



### Pollination

More Bee = more demand and consumption  
= more pollination

- not associate specifically with pollen gatherers
- Both nectar & pollen collectors are effective
- Both have the same exposure to chemicals in their working landscape.



## Best Practice pollination - a beekeepers perspective



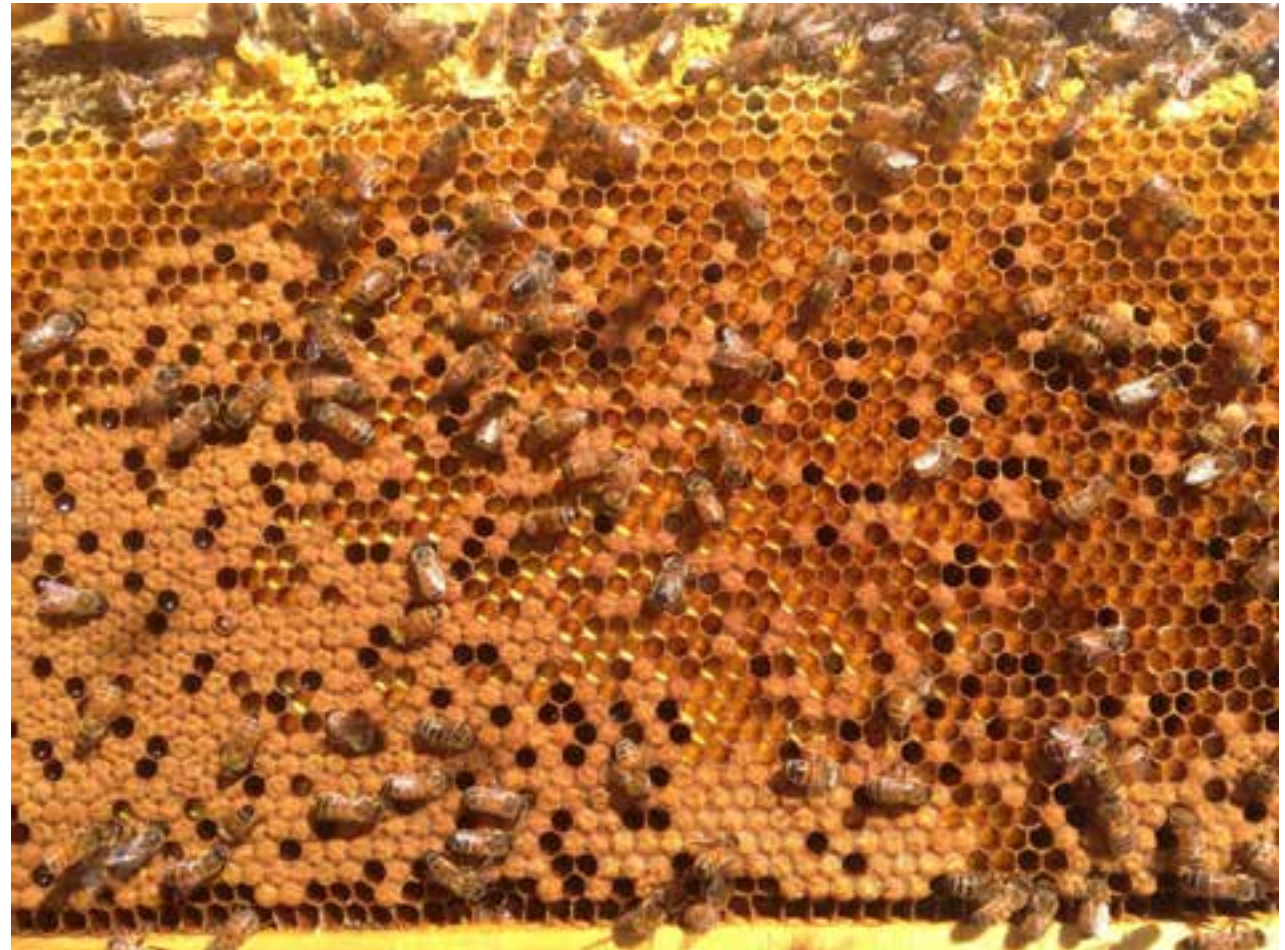
### Pollen collection

- A good colony can collect between 50 Kg and 100 Kg of pollen annually (Sommerville, 2005)
- Pollens 'aint' Pollens
- Crude protein levels vary from plant to plant

### Nectar collection

- A good colony with collect up to 800 kg of nectar
- Depending on moisture –reduced to 10% - 20%

# Best Practice pollination - a beekeepers perspective



## **Adult Worker Honey Bee Life Cycle**

After the **adult** emerges she begins to take on tasks in the hive. She spends the first few days cleaning cells (day 1 and 2), then she takes on the role of **nurse** (day 3 to 11) where she feeds developing larvae. After feeding duty she works to cap cells with wax that she produces (day 12-17). Her final days working in the hive are spent guarding the front entrance (day 18-21). After about three weeks in the hive she transitions to the role of **forager** and goes out to collect food for the colony (23 days and beyond).

The total worker bee life span from laid egg to the death of the adult averages 7 to 9 weeks. It takes 3 weeks for the egg to develop into a worker adult. The adult then lives for 4 to 6 weeks. Some worker bees that are produced in the fall live longer than 9 weeks because they spend the winter in the hive and have early foraging duties in the spring.

# consumption of Pollen



- The Nurse bees are using pollen to make the brood food
- 5% of the brood food is raw pollen.
- After 21 days the young bee hatches and instantly obtains nectar for energy and then importantly will start consuming pollen to build up protein levels.
- A little at first, but really gorges until about 5 days where she tanks out and her body is developed, in particular her mandibular Glands
- Which enable her to become a royal jelly producing nurse, where she continues to consume pollen in producing the jelly for brood rearing .
- The Nurses are delegated to the consistent feeding of protein to forages



- He found that bees used 121 g of honey (that is, the energy stored in this amount of honey) to raise one thousand adults from an age-mixed brood comb, and about 163 mg of honey to rear one egg to the pupal stage.
- The collective effort of the adult bees maintains the brood area at an almost constant temperature around 36 °C. In this environment, larvae grow very fast and increase their body mass almost 1300-fold (from 0.11 mg to 159 mg) within 5½ days showing exponential growth within the first 5 days.

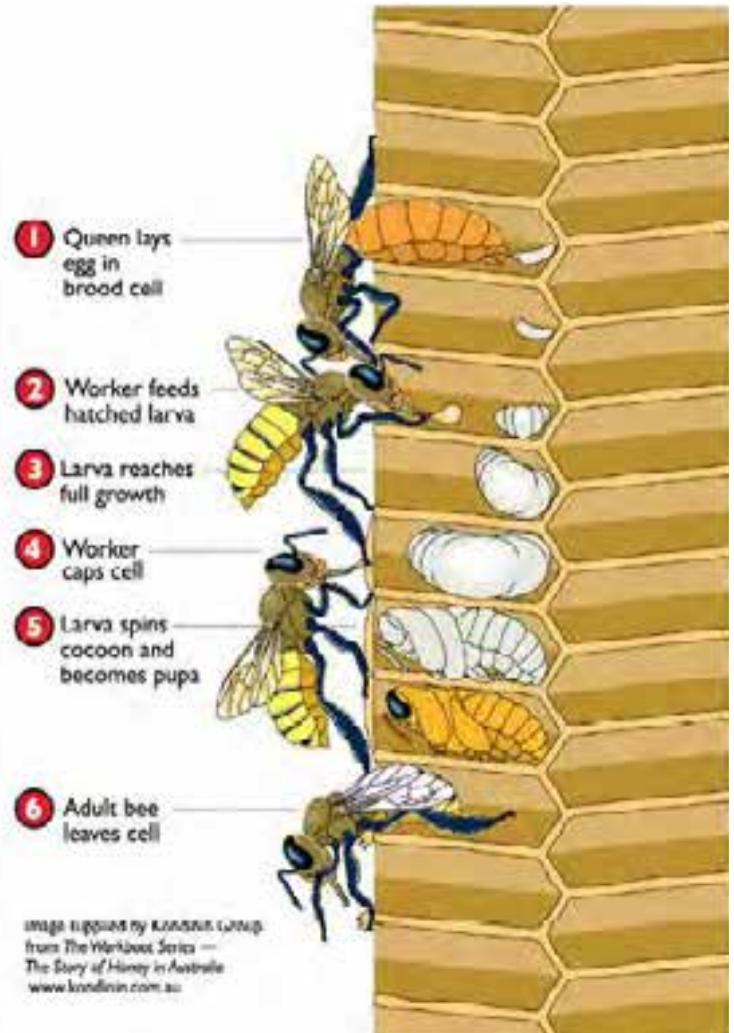


The nurse bees digest the pollen and nectar and convert it into a fluid called “jelly”, secreted by their hypopharyngeal glands (Hanser and Rembold, 1964). The jelly is rich in proteins and contains several kinds of sugar (Brouwers, 1984). The nurses feed jelly to the brood, to the queen, to drones and to adult bees performing other tasks, especially to foragers (Crailsheim, 1992).

nurse bees typically are from 5 to 16 days old. He showed that even 40–98 days old bees are able to rear brood,

# Brood

- Is the name given to all unhatched young
- 21 day cycle to hatching
- Eggs hatch after 3 day
- jelly
- On the 5<sup>th</sup> day pollen feeding begins.



## Key Point 2

The major stimulus for pollen foraging is largely the presence of Brood pheromones produced by young larvae



# The Queen

- She generally only leaves once or twice
- Mates 7 -10 times
- Long abdomen for sperm storage
- Stores 2-3 million sperm
- Lay up to 2000 eggs per day
- The importance of good foundation
- Cell size 5.5 mm
- Determines whether she will fertilise the egg or not
- Because we buy our queens already mated we don't need them.



Division of labour can be seen as allocating several distinct tasks among distinct cohorts of bees. In a honey bee colony, this is an age related process called age polyethism.

Each potential forager also has to decide whether to primarily gather nectar or pollen. Many studies have shown that honey bee colonies regulate their pollen foraging according to the current colony demand (Moeller, 1972). When the colony is in need of pollen, a greater fraction of foragers collects pollen (