



**Pollination Symposium 2009**  
Keith Institute.



### Bee Basics



- Ben Hooper
- How the hive works
- The importance of the queen
- Life cycle of the workers
- Out line the importance of a strong hive

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### Why we all use square hives ! A very brief history lesson



L. L. Langstroth

- This old chap Langstroth
- Way back in 1851
- Discovered "Bee Space"
- "Bee space" is ideal internal spacing's of a bee hive.
- With Langstroth's Bee space and commercial demand .....

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**We use the wooden box!**

- Products are readily available
- Storage and transport
- Promote adequate bee space
- Durability - weather
- Insulation properties
- Regulated at around 34°C

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<u>Queen</u>	<u>Drone</u>	<u>Worker</u>
<ul style="list-style-type: none"> <li>• 15 – 20 mm</li> <li>• Tapered abdomen</li> <li>• One per hive</li> </ul>	<ul style="list-style-type: none"> <li>• 15 – 18 mm</li> <li>• Twice as heavy as a worker</li> <li>• Stingless</li> <li>• Mating</li> <li>• Cannot feed</li> </ul>	<ul style="list-style-type: none"> <li>• 13 – 17 mm</li> <li>• All females</li> <li>• Av. Life span of six weeks</li> <li>• Undertake many tasks</li> </ul>

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### The Queen



- She generally only leaves once or twice
- Mates 7 -10 times
- Long abdomen for sperm storage
- Stores 2-5 million sperm
- Lay up to 2000 eggs per day
- Up to twice her weight in eggs a 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.

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**Key Point 1**

It is important to understand the workers life cycle and social structures to pin point what Drives the honey bees to collect pollen and ultimately pollinate your crop

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**Life Cycle of Workers**

There are 5 General stages of work

- Start as nurses
- Then become receivers and constructors
- Ripeners
- Guards
- Then foragers

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**Brood**

- Is the name given to all unhatched young
- 21 day cycle
- The Eggs hatch after 3 days
- They are fed royal jelly for two days
- Then fed a basic brood food
- Until they are capped



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**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 must also constantly feed protein to forages

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**Key Point 2**

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

Keeping in mind that the stimulus for breeding is the access to nectar

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**Demand for Pollen**

- So it is the constant demand to feed the forages and the young that drive the bees to collect pollen.
- It is also an the inventory of pollen stores with in the hive, so making sure there is an adequate supply for the colony to consume under less resourceful conditions during bad weather and seasonal change. i.e. our long cold wintering periods.

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### Pollen collectors

- After the nurse loses her ability to adequately supply nutrients to the brood and foragers she is relegated to the other tasks of house keeping
- It is generally into the third week of its life that a bee begins to forage.
- Foraging is the last stage a bee will undertake and nectar collecting is last even to pollen collection.
- These are important days for the lucerne seed producer. Although a bee may spend the rest of its life collecting pollen, on average 70 – 80% of bees will change from pollen gathering to nectar collecting depending on the demands of the hive.

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• Bees cannot talk to each other so they communicate through dances, vibrations, and body chemical signals.  
 • Despite these extremely accurate descriptions of resources by the scout bees.




Round Dance  
For resources less than 100 m

The Waggle Dance

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The young forages simply ignore instruction from the scouts and embark on their own foraging flights to the first available flowers to strip of pollen and nectar.

### Key Point 3

Whilst all foraging bees can still stimulate pollination, it is the immature forages that are the most successful seed producers as these teenagers will continue to cop the wack of the tripping lucerne flowers, for around 3 -7 days until they learn to enter the flower from the side only implicating cross pollination.

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### Bee Numbers

- Generally there are about 3000 bees per frame
- A good hive is considered to have 12 + frames of bees
- A strong hives is considered to have 17 + frames of bees
- So a good hive has around 36000 bees, of these around 1/3 are required to do home duties, thus leaving 24000 for foraging.
- On average 10% of these will constantly be collecting water and this number significantly increase with temperatures are above 35°C as they work on an evaporative cooling system.

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### A good operator

These hive strengths are averages

A good commercial operator will be aiming to deliver 85% of their hives at or well above what the industry considers a standard pollinating unit.

Thus optimising your available field bees

This is subject to seasonal conditions

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### What you want in a hive !

- A young vigorous queen that will optimise egg laying to promote a need for pollen
- A good queen will ensure a large brood box which will consistently replenish the immature bees
- A strong colony to maximise the availability of healthy field bees.

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### What you want From an Apiarist !

- Good lines of communication. To secure introduction of hives at the right time. Also that they are placed in desirable locations for both parties.
- You simply need to see them working the bees. They must work their hives to clear honey to promote a need to forage. Most importantly they must work the brood box to ensure strong hive health.

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### What apiarists would like !

- We believe it to be a positive action to apply chemical at night and not in the morning. Thus minimising the loss of workforce to the hive.
- Access to fresh water is very convenient, a load of bees can use in excess of 400L of water a day. This is hard to keep up as it is a legal requirement.
- The ability to leave the sites when necessary, due to the hostile environment for the hive at the end of lucerne flowering as it generally is the end of nectar flow in the area.

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### Stocking Rates

Currently stocking rates for lucerne vary a little but for our area an average can be comprised at 2.5 hives to the hectare for irrigated and 1 hive to the hectare for dry land.

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### Stocking Rates and \$\$\$\$

By increasing stocking rates apiarist are sacrificing two key factors which would add a considerable amount to the commercial reality to pollination for lucerne seed production.

The first being the loss of income that would have been derived from the potential honey flow. For example

One super of honey on Avg. = 20 kg's  
20 kg @ \$3.00 kg = \$ 60

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### Stocking Rates and \$\$\$\$

The second is the overall detriment to the health of the hive.

The Lucerne fields are stressful working environments for the honeybee. Their lives are significantly shortened due to

- susceptibility to insecticides
- Damage suffered to their wings from the thick entanglement of the understory
- The increased work load on gathering resources on an intensified crop
- The peak heat of summer coupled with the cooling of the hive and themselves is extremely stressful
- They literally work themselves to death

A major health factor is due to the protein level found in Lucerne pollen. It is regarded as poor or at best below Average nutrition for honeybees according to Dr Doug Somerville's research it sits around 20- 22% crude protein. This alone over time is not good enough to sustain a colony.

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### Moving Forward

There is room to move and our industry is very open minded about changing techniques.

Forging strong relationships with our related industries is key. We are a small facet of Agriculture but the majority of commercial apiarists are good professionals.

We certainly enjoy the professionalism that Pollination Australia is bring to the table and I hope that we can offer more support to unifying our industries and standards

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