

Optimising AHB bait/feeding station design & attractants

Progress Report December 2012



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Introduction

The AHB Science team is currently conducting experiments in order to fulfil AG2Biii and AG2C of the Asian honey bee (AHB) Transition to Management (T2M) Plan, i.e. to “determine the effectiveness of bait stations, their design and attractant effectiveness”, and to “investigate alternative control techniques and attractants”.

The current document is a progress report that provides a brief overview of the trials and experiments that have already been conducted, and the future trials planned for early 2013.

Bait/feeding station design

In consultation with Dr. David Guez, several different bait/feeding station designs have been trialled. These include:

Traps:

- Standard AHB sand/syrup trap as used in the past
- Bottle trap (plastic bottle with a fake yellow flower that surrounds the entrance hole)
- Bottle trap (plastic bottle that had the top cut off and inverted into itself)
- Sticky mats (standard and using TacGel for increased stickiness)
- Yellow, blue and white pan traps filled with detergent water
- Chicken feeder
- Automatic pet feeder

Feeding stations:

- Standard AHB sand feeding station as used in the past
- Bowls with rocks or sticks as landing platforms
- An upturned glass jar on top of different kinds of napkin-covered dishes (plastic plate, plastic bowl, ceramic plate, ceramic bowl)

Photos of all traps/feeding stations can be found in Appendix 1.

Several of the traps were trialled in conjunction with the first two rounds of detection efficacy field trials. These included the AHB sand trap, bottle traps, sticky mats and bowls traps. As part of the efficacy field trials, these traps were deployed for one week in September and one week in October at each of eight different sites (two sites each in: Gordonvale, Cairns City, Kuranda, rainforest). They were placed at

random on top of (or hung from) four timber platform stations placed in a 2x2m square (Figure 1).



Figure 1 Trap stations set out in a 2x2m square with various traps placed on top of or hung from stations. Traps deployed in the photo are (clockwise from left): sticky mat, pheromone trap + bottle trap, AHB sand trap with lid, pan traps + bottle trap.

In addition, all trap/feeding station designs are being trialled in proximity to hived AHB. Two sets of timber platform stations have been set up at 5m and 50m from the AHB hives. Bottle traps were also hung from a nearby fence and from the gazebo providing shade for the AHB hives.

Preliminary results and discussion

Traps:

As part of the efficacy field trials, only one bee (EHB) was trapped in a yellow plastic bowl. No other traps trapped any bees in the two weeks they were deployed.

Traps deployed near hived AHB that caught bees were simple inverted bottle traps, bottles with fake flowers, and a simple juice bottle left open. These caught AHB, EHBm and *Trigona* sp. bees.

Feeding stations:

The upturned glass jar on top of a napkin-covered plastic bowl shows the most promise as a feeding station. AHB seem to be able to land on the dry napkin and easily take up syrup from the puddle around the glass jar. The glass jar serves as a reservoir. To “top-up” the syrup, the glass jar needs to be lifted slightly. However, in dry conditions, the syrup does dry out and does not automatically “top up”. Covering the station with a lid for shade is an improvement. Automatic “topping-up” of the station would be preferable and more practical for field use. However, neither of the automatic chicken/pet feeders was visited by AHB, likely due to the inappropriate “lip” of the bowl that bees have trouble landing and feeding on. An improved landing platform will be devised.

AHB did easily feed on syrup in a bowl with rocks as landing platform.

These feeding stations seemed to work much better than the traditional AHB sand feeding station. This may be due to AHB preferring not to get sticky feet and/or because the syrup can be taken up by the bees much more easily and quickly from syrup that is not covered in sand.

Attractants

In consultation with Dr. David Guez as well as utilising ideas from local and volunteers beekeepers, several different attractants have been trialled. These include:

- Different essential oil-based scents (including lavender, rose, jasmine and orange)
- Yellow cordial
- Honey water
- EHB queen pheromone (9-ODA)
- AHB queen mandibular pheromone mix (sourced from Mike Lacey, CSIRO)
- The flowering orchid *Cymbidium floribundum*
- Different colours (yellow, blue, red, white and black)
- Different sugar concentrations

Several of the attractants were trialled in conjunction with the first two rounds of detection efficacy field trials. These included cordial, honey water, EHB queen pheromone and different colours (blue, yellow and white plastic bowls; yellow plastic flower on bottle traps – see Appendix). As part of the efficacy field trials, these attractants were deployed for one week in September and one week in October 2012 at each of eight different sites. They were placed at random on top of (or hung from) four timber platform stations 2m apart (Figure 1).

In addition, all attractants listed above have been trialled in close proximity to AHB hives. Scents, sugar concentrations and colours were trialled by James Cook University students.

Preliminary results and discussion

As mentioned previously, only one single EHB was trapped in a yellow plastic bowl during the efficacy field trials. Yellow cordial, very dilute honey water and EHB queen pheromone did not trap any bees. It is unclear whether this is due to the trap design, trap placement, or the attractant itself. Further trials will determine ideal trap placement.

Scent trial

The JCU student's preliminary results showed that AHB seemed to have no preference for any of the trialled essential oil-based scents. However, AHB seemed to dislike jasmine – visitation rates were similar for all scents but surprisingly low for jasmine. Analyses and further trials are planned for January 2013.

Sugar concentration trial

Preliminary results showed a great preference for highly concentrated sugar solution. The highest visitation rates were to 75%ww sugar solution. This is surprising but may be explained by the closeness of the feeding station (David Guez, pers. com.). Further trials are planned for January 2013 to test whether feeding station at different distances results in different sugar concentration preferences.

Colour preferences trial

Preliminary results showed a preference for blue. Blue had the highest visitation rates, whereas all other colours had similar visitation rates.

Other trials

Other trials conducted near hived AHB showed that both AHB and EHB do get trapped in simple bottle traps containing 50/50 honey and water. Efficacy of a honey/water trap needs to be evaluated.

In addition, the flowers of *Cymbidium floribundum* showed great and immediate attractiveness to AHB worker bees (Figure 2). However, this orchid is a cool-climate orchid and flowers did not last. Dr. David Guez is sourcing the synthesised chemical attractant for this orchid to use in trials.

Finally, a trial in which both EHB and AHB queen pheromone were offered at 1m from AHB hives showed slightly higher attractiveness of AHB pheromone. However, neither was highly attractive. This experiment needs to be replicated.



Figure 2 **AHB trying to get to the gauze-covered flowers of a potted *Cymbidium floribundum* in Cairns, Queensland.**

Future trials

Future trials planned for early 2013 include:

- Further improvement of the upturned-jar feeding station
- Improvement of the automatic pet/chicken feeder feeding station
- With an improved attractant, simple bottle traps will be re-trialled
- A range of further essential oil based scents will be trialled
- Honey water, molasses, EHB & AHB queen pheromone, *Cymbidium floribundum*, different sugar concentrations and other attractants will be trialled in a more rigorous experimental design with replication.
- Ideal trap placement (distance, sun/shade) will be determined

Appendix – Bait/feeding station designs

Standard AHB sand/syrup trap



Sand/syrup trap without lid



Sand/syrup trap with hood

Bottle traps



With fake flower attachment



Simple inverted bottle trap

Sticky mats



Standard sticky mat – as is (left half) and with TacGel for increased stickiness (right half)

Yellow, blue and white pan traps



Chicken feeder



Automatic pet feeder



Bowls with rocks or sticks as landing platforms



Upturned glass jar feeding station



Upturned glass jar on napkin-covered plastic plate. This is an example and does not contain syrup.



AHB feeding on 75%w/w sugar solution on upturned glass jar feeder.



AHB feeding on upturned glass jar feeder covered in blue paper.

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