

**A Modified Two-Queen System: “Tower” Colonies for Drone Brood Removal
Protocol for Participating beekeepers**

The following protocol is meant to be used by beekeepers who are interested in testing the tower hive configuration and drone brood removal method as a Varroa control method in Maryland. Please visit http://www.beebehavior.com/modified_two_queen_system.php for more information on the advantages of using this integrated pest management (IPM) form of controlling Varroa mites during the honey flow. Participating beekeepers should be experienced in basic bee management and be able and experienced in quantifying mite populations in their colonies using the powered sugar roll method. We also request that you begin with single deep bodies on the colonies used for this study if possible.

In addition to confirming our initial results, we want to replicate this experiment to get a better idea of any other impacts this may have in terms of increased honey production, and queen replacement.

If you are participating in this experiment please contact Jennie Stitzinger via email or phone at jnstitz@gmail.com or 215-901-3857 when you initiate the project and if you have any questions before or during your participation. This will allow us to gauge how many people are participating and your contact information and start date will enable us to remind you (via email) when certain activities need to be conducted.

PLEASE FIND THE PROTOCOL WITH ALL INSTRUCTIONS ATTACHED. READ ALL THE INSTRUCTIONS IN THEIR ENTIRETY PRIOR TO BEGINNING.

Tower experiment protocol

Materials you will need:

- A. A minimum of 4 hives or more (but in multiples of 4 - so 8, 12, 16, etc.)
in one apiary

For each set of 4 colonies you will need:

- B. Equipment to perform sugar rolls on each study colony 3 times over the season (this would be a flat white pan, a sugar roll jar and powdered sugar). See this link for further information:
<http://www.extension.org/pages/22279/powder-sugar-roll-for-varroa-sampling>
- C. 1 queen excluder that lays flush on the top of the brood nest between 2 of the 4 hives
- D. 3 frames drawn drone comb (or 3 frames containing drone foundation)
- E. 2 modified “covers” – a piece of plywood/plastic/metal that will cover ½ of the exposed brood nest in the tower experiment (See Figure 2).
- F. A black water resistant marker
- G. Data collection sheet (see Table 1) and a pen

- 1) Please select 4 colonies, all of which should be located in (or be moved into) the same apiary. Ensure that each is disease free, has a laying queen, and is approximately the same in size. It is preferred that each colony consist of only 1 deep body (containing brood and stores). Colonies should have the same number of drawn frames and/or foundation as each other (i.e., some colonies should not have all foundation and others all drawn comb. All colonies should consistently have the same drone frame type applied to each).

- 2) Place the colonies in a single apiary and record the apiary and colony details on the data collection sheet.
- 3) Randomly label each colony with a unique identification number (using the water resistant marker). The label should start with your initials, followed by the apiary name (e.g., the street name where the apiary is located), and then a number 1-4. For example: JS-Streetname-1, JS-streetname-2, etc. If you are using more than one set of 4 colonies in an apiary, label the second set of hives with the label "-B", the third set with the label "-C" etc. So labels would appear JS-streetname-1-B, JS-streetname-2-B, etc. **See Table 2** for a sample data sheet. **Table 1** is an empty data sheet provided for your use.
- 4) The colony tagged with a label ending in the number '1' will be the control colony and should be managed 'normally.' Colonies numbered '2' and '3' will be used for the tower configuration (**See Figure 2**) and the colony tagged as number '4' will be used for drone frame removal in a normal colony configuration.
- 5) Quantify the number of mites in each colony by removing a 1/2 cup of bees from a frame containing brood and perform a powder sugar roll shake on the collected bees. Record this information on the data collection sheet.
- 6) Arrange colonies '2' and '3' side by side, with one long side touching. Colonies '1' and '4' may be placed, spaced apart anywhere throughout the apiary.
- 7) Remove **1** brood frame from the top brood box of each colony tagged '2,' '3,' and '4.' You may add these 3 removed brood frames to other weaker colonies or combine all 4 together with a new queen to begin a nuc. Replace each brood frame with a frame of drawn drone comb or a frame containing drone brood foundation. NOTE: colonies should either have a frame of drone comb or

foundation added (not some with drawn comb and some with foundation). The frame of drone comb should be placed as the third frame in from the one side of the brood nest (**See the green frame in Figure 1**). Record the day that you added the frames, and remember that you will need to return to the colony to remove this frame in 27 – 30 days. Be sure to note on the data sheet whether you have added a drawn comb of drone brood or a sheet of drone brood foundation.

- 8) At 27-30 days after the drone brood frame was added, remove the frame of drone brood from the tower colonies ('2' and '3') and the colony tagged '4'. Be sure to estimate the percentage of the frame that contains capped drone brood and record this number on the data sheet. Place the frames in the freezer over night and put them back into the colonies the next day, after allowing them to thaw completely. Repeat this at 27 - 30 day intervals for the remainder of the study.
- 9) Perform a sugar roll on bees collected from a frame containing nurse bees in EVERY study colony each time you remove drone brood. This sugar roll should be performed on the control colony ('1') as well. Record the results. Also be sure to note if you see evidence of a queen in the colony and record what you find in the notes section. If a study colony goes queenless, replace the queen as you would normally; however be sure to record this in the notes section.
- 10) When you are ready to super colonies, please follow these instructions. In the tower colonies, place the queen excluder in the middle of the two brood nests, and place a super above the queen excluder. Place the modified lids or covers on the portion of the brood nest not covered by the honey supers (**See Figure 2**).
- 11) At the end of the honey flow, remove all supers for harvest, recording how many frames of capped honey were removed from each colony. (Note: for the tower colony, record frames removed from the tower only under colony number '2,')

leaving colony '3' blank.) Be sure to note the size of honey supers (shallow, mediums, or deeps).

12) Take a final sugar roll sample from all colonies when you remove the honey supers and record the numbers on the data sheet.

13) Make a copy of your record sheet and send it to Jennie Stitzinger. If you have access to a scanner, please scan your data and email it to Jennie at jnstitz@gmail.com. If you would prefer to mail it to her, please use the following mailing address:

Jennie Stitzinger
University of Maryland, Entomology
4112 Plant Sciences Bldg.
College Park, MD 20742



**Figure 1: Green Drone Brood Frame in Position 4 in the Tower Hive
(Note: we are requesting that you insert the drone brood frame in Position 3)**



Figure 2: Tower Hive (colonies '2' and '3') with Honey Supers