

Rearing superior honeybee populations by observing their nest cleaning behavior

WHEN honeybees clean up the dead brood cells in their hive, this is usually called hygienic behavior. It is an inherited trait. The behavior is the primary mechanism of disease resistance to 'chalk brood' and 'American foul brood' of honeybees. Bee keepers can efficiently select superior queens by observing the nest-cleaning activities of worker bees. By rearing the superior queens which have been selected, it is possible to improve the hive's genetic resistance to larval diseases.

How to observe nest-cleaning behavior

Selecting the comb

Use experimental colonies which have enough brood combs (i.e. more than six combs) in the hive. Take out a single comb containing newly capped brood.

With a color marker pen, mark the position of a cell or several cells just above three groups of nine newly sealed cells (Fig. 1). Mark also the top bar of the comb frame that contains the cells used for observation (Fig. 2).

Killing the larvae

Kill the larvae in a total of 27 cells of the comb by pricking them with a fine pin or needle. To make sure the larvae are killed, prick them several times at different angles (Fig. 1).

Place the treated comb back into the brood rearing area of the hive from where the comb was taken (Fig. 3).



Fig. 2. Marking the frame where the comb is being tested



Fig. 1. Marking and killing the larvae in newly capped brood cells



Fig. 3. Placing the test comb in the hive

Cooperating agency for this topic:

Observing the results

Twenty four hours later after the larvae were killed, count the number of cells which have been uncapped and completely cleaned out (Figs. 4 and 5). Colonies where more than 24 cells (90%) have been cleaned out are considered to have the hygienic trait.

From the colonies found to have good hygienic behavior, new superior queens can be collected to replace old queens in other hives. This will improve the disease resistance of the bee colonies.

Rearing the queens

Using natural queen cells

When colonies have been selected for their better hygienic behavior, using this method, beekeepers can then use the queen cells of the selected colonies for swarming, or for replacing old queens. The easiest way to introduce the new queen is to cut out the sealed queen cell with a sharp knife, and place it into the comb of queenless hives.

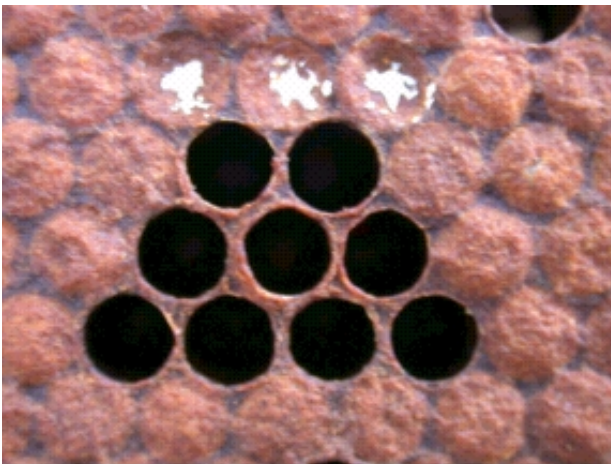


Fig. 4. All nine brood cells have been cleaned up one day after the larvae were killed



Fig. 5. Only five cells are cleaned, two cells have been uncapped but are not cleaned, while dead larvae still remain in two cells

Using artificial queen cells

If beekeepers wish to rear many queens from a colony showing good hygienic behavior, they can use artificial queen cells (Fig. 6). They should take a comb containing young larvae of worker bees, and construct queen cells by grafting. Larvae from 8 to 36 hours old are suitable for grafting. They may be the same length as the eggs, or up to 50% longer.

Using a grafting needle, young larvae can be transferred from a worker comb to artificial cell cups primed with royal jelly. As soon as a series of cells has been grafted, the cells should be immediately given to a cell-building colony that is strong and separated from any queen (Fig. 7). After each grafted cell has been sealed, it can be placed into any queenless hive.



Fig. 6. Worker bees build up the artificial queen cells



Fig. 7. Adult queen bees attended by worker bees