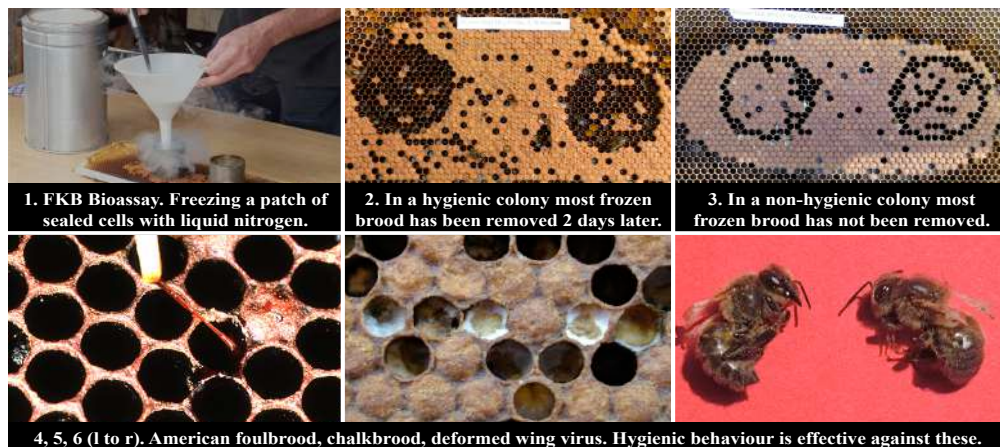


Hygienic Behaviour: Background & Disease Control

Honey bees suffer from numerous pests and diseases. Many beekeepers put time and effort into controlling these. Wouldn't it be nice if the bees took care of their own diseases? This is not as far-fetched as it may sound. Honey bees have many natural mechanisms for disease resistance. The aim of this pamphlet is to give beekeepers information on one of these: hygienic behaviour (HB).



HB is a collective defence against brood diseases. Hygienic workers uncap sealed brood cells containing dead and diseased larvae and remove the contents. In this way they reduce the spread of pests and diseases within the colony. For example, if a diseased larva or pupa is removed quickly the disease may not yet be infective. In the case of varroa mites, female offspring will not yet be mature and so will die, thereby reducing varroa increase in the colony.

HB was first studied before WW2 in the USA to control American foulbrood (AFB), a serious brood disease caused by a particular species of bacteria. More recent research by Professor Marla Spivak of the University of Minnesota has confirmed that HB can be highly effective in AFB control.

In June 1998 and 1999 in Minnesota, colonies were challenged with AFB by inserting a 15 x 15cm patch of cells containing hundreds of AFB scales (larvae killed by AFB). Of the 18 hygienic colonies tested (these removed more than 95% of freeze-killed brood, FKB, within 2 days), 7 showed symptoms of AFB of which 5 recovered by mid-August. Of the 18 non-hygienic hives tested (which removed only 32-73% FKB) all 18 showed AFB symptoms of which only 1 recovered. The same experiment also monitored chalkbrood occurring naturally in the same hives. None of the hygienic colonies versus all but one of the non-hygienic colonies had symptoms (mummies) at the final hive inspection in August.

LASI has studied the effect of hygienic behaviour on varroa and deformed wing virus, DWV. Over one year, varroa numbers in highly hygienic colonies (more than 95% FKB removal in 2 days) increased by less than half that of non-hygienic colonies. Highly hygienic colonies also had 10,000 times less DWV. When a colony has a high level of DWV it will have some workers with shrivelled wings (Fig 6). This is usually a sign that the colony will soon die. However, if the colony is given a hygienic queen, this can save its life.

HB helps control pests and diseases in sealed brood cells. Research results show that HB is highly effective against AFB, chalkbrood, and DWV (Fig. 4-6), and slows down varroa population growth. Although chemicals can be used against AFB and varroa, none are effective against chalkbrood or DWV.

More Facts about Hygienic Behaviour

- * HB is not learned. It is genetically programmed. This means that HB can be bred for.
- * The best way to determine if a colony is hygienic is to freeze a patch of sealed brood with liquid nitrogen. Colonies are considered highly hygienic if they remove more than 95% of the freeze-killed brood within 2 days. This is the FKB bioassay. (Fig 1-3)
- * HB occurs widely but is generally rare. LASI surveyed 31 colonies in Derbyshire, UK. Only 1 was highly hygienic. Breeding can rapidly increase levels of HB in your colonies.
- * It is not known why HB is rare. Research by Professor Spivak has shown that hygienic colonies make more honey, and research at LASI has shown that hygienic colonies do not remove any more healthy brood, by mistake, than non-hygienic colonies.

How Can Beekeepers Take Advantage of Hygienic Behaviour?

- * Beekeepers can purchase hygienic queens or breed them using standard queen rearing methods. Simply rear queen cells from hygienic colonies, whether purchased breeder stock or your own tested colonies. Instrumental insemination is not needed.
- * If you want to rear hygienic bees from your own hives you need to test 25 or more with the FKB bioassay to have a chance of obtaining a few hygienic colonies to breed from. The FKB bioassay is not hard. It is simply a new method for beekeepers to learn.
- * Not all the bees in a hive need to be hygienic for the colony to be hygienic. This is helpful as it means that a hygienic queen will only need to mate with a few hygienic drones to head a hygienic colony. Honey bee queens generally mate with 10-20 drones.
- * Unlike the use of chemicals, HB is not a short term remedy against a single disease. Rather, it offers a long-term solution against a wide range of brood diseases.