Better beekeeping in top-bar hives

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We welcome Pam Gregory as a regular contributor to BfD Journal. In this, the first of several articles that will look at top-bar hives, Pam explains how to get the best out of them. Pam discusses theories that underpin movable-comb beekeeping and how honeycomb is shaped.

Bees' comb built from a top-bar

Movable-comb technology

The use of a top-bar hive - a form of movable-comb hive - opens up exciting new opportunities for beekeeping management in many parts of the world. Top-bar hives are often promoted as the best way of keeping bees in developing countries; especially by governments or college-educated trainers keen to promote new and seemingly modern ideas for development. However, when visiting practical beekeepers I have noticed the everyday reality is that these hives do not always work well because the people using them have not properly understood either their power or their limitations. This can lead to poor use of the technology, disappointment or failure and sometimes the abandonment of a promising technique.

The importance of bee space

Although top-bar hives can often look crude, especially if they are made of simple, local materials, the ideas underpinning them are actually very sophisticated. They are based on the vital concept of the bee space. The bee space is at the very heart of the bee's biological programming. Combs are built in a regular manner with clear spaces between them so the bees are able to pass freely around the nest. All the combs are built with the same spacing between them. This space is precise and the bees maintain it carefully. If the bee space is exceeded the bees will fill it with comb (known as brace comb). This simple observation, made so long ago, allowed the development of both movable-comb frame hives and movable-comb top-bar hives.

In northern races of *Apis mellifera* the bee space is accepted as ranging between 7 and 9 mm. In smaller, tropical bees the space is correspondingly less. In practice it is the distance needed for two worker bees to pass comfortably back-to-back between the comb faces. Knowing this can help when working out hive design specifications. In particular it is essential knowledge to work out the top-bar dimensions. It cannot be emphasised enough that accurately sized top-bars are the key to successful movable-comb beekeeping. If the top-bar size is right the bees will oblige by building one comb from each top-bar. The correct size will vary slightly from place to place depending on the local bee type and ideally should be determined experimentally by measuring local bees and comb. However, in general it is fairly safe to use a top-bar width of 32 mm for African *Apis mellifera* honeybees, 35 mm for northern *Apis mellifera* honeybees and 29 mm for the Asian hive bee *Apis cerana* (although *Apis cerana* varies greatly in size

Bees' comb built within a frame

throughout the region where it occurs, as does *Apis mellifera*). Notice that this spacing is not the same as the bee space but incorporates both the bee space and the width of the comb to give a measurement that goes from the centre of the first comb to the centre of the next one.

Comb shapes

Now let us look at the very particular way honeycombs are shaped if the bees have a free choice. Combs are only attached at the top and not at the edges, which taper to become very thin with a slightly ribbed reinforcement along the edge. This special form is called a catenary curve and describes the wide topped, gentle "U" shape of natural comb *(see right)*. This applies to comb from all species of honeybees. The sloping sides of the standard designs of top-bar hives attempt to reflect this natural catenary shape. This is important as it allows the bee space rule to be observed all down the side of the hive where the comb is built in its natural form, without the constraining influence of a frame. Where a curved comb is built in a square box there is always the possibility that the bees will attach the comb to the side of the box because the bee space has become too large.

Precise measurement needed

It is ideal if beekeepers are able to make their own equipment. This is especially important in areas where beekeeping is being used as a means of improving poor people's livelihoods. If beekeepers make their own top-bar hives it allows them to experiment with the technology at little cost or risk. In practical terms, however, the hardest part is to cut accurate top-bars for the hive. In the absence of a ruler, this can be aided by finding a standard measure so that the top-bar width can be easily checked. An ingenious idea (shown to me in Cameroon) was to use an old rectangular 9V battery. The width of this was exactly 32 mm and it formed a useful measuring tool. If these batteries are not available look around for another common item that is the same size as the width of the top-bar. For instance, I have found a soda or beer bottle top measures 30 mm and with the thickness of a pencil line drawn on either side gives a 32 mm width quite easily with no need for rulers.

Comb built from a top-bar showing the catenary curve shape

Yenenew Bezabih demonstrates how to make top-bars in Fleket, Amhara Region, Ethiopia

Top-bar hives are an efficient beekeeping tool because they allow the same flexibility of management as a frame hive. It is the potential for sophisticated management combined with low costs that makes the top-bar hive ideal in many situations. Top-bar hives can help to improve yields and simplify harvesting without the need for the complicated equipment that has become essential for beekeeping in industrialised countries. There is no management activity that can be done using a frame hive that cannot be done in a top-bar hive, although slightly different techniques may be needed. However, the underlying ideas behind the use of top-bar hives need to be thoroughly understood. It is also most important that beekeepers are quite clear about what exactly they want to achieve before abandoning other tried and tested local and traditional techniques.

Gladstone Solomon with two combs from a top-bar hive in Tobago

Further information

Web forum *Working with top-bar hives* **www.beesfordevelopment.org/forums.shtml**

Video: *How to manage the African bee in top-bar hives*. Price £22.90 €34.40 (Code VID05)
How to order? See page 15

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