The Kenya-Top-Bar-Hive (KTBH) as a better hive in the developing World

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Beekeepers are a contentious lot. We can argue contentedly forever about everything, from African bees and the best type of hive to manage them, to Zero-g behavior of bees on the space shuttle. But the question of which hive is best for beekeeping in the developing world goes beyond beekeeping and enters the realm of economics and development theory (and if there exists a more contentious lot than beekeepers they'll be found among economists and development workers).

Owing to the complicated history and biology of the honeybee in the developing world, apiculture remains at a relatively low state of development in many places. The Kenya Top-Bar Hive (KTBH) offers affordable intermediate technology with yields that are alleged to rival those from Langstroth-type equipment. However, firm quantitative data for comparison under actual field conditions is lacking. Comparative data for yield would be very helpful to new beekeepers and particularly to rural extensionists who ought to offer technological alternatives appropriate to the goals and resources of the people with whom they work.

The KTBH was developed along principles of certain Greek basket hives which may date back to the time of Aristotle. Its modern avatar was "invented" by J.D. Tredwell and P. Paterson in 1965(1) and was employed in a rural extension project directed by the University of Guelph in the 1970's(2). The hive is quite simple in concept. Combs are supported by bars of wood which lay across the narrow width of the trough-like hive-body. The width of each top-bar is equivalent to the natural width of a comb plus a bee-space (35 mm. or 1 3/8 inches). Thus, as in the Langstroth hive, the combs are maintained at their natural spacing from one another. Unlike the Langstroth hive, however, the combs in a KTBH are supported only at the top and are not enclosed by a full frame. Honey-comb in natural nests is roughly in the shape of a "U", wider at the top than at the bottom. This shape is stable even when supported only along the top edge. The design of the KTBH (an inverted trapezoid when seen in cross-section) allows the bees to maintain the natural shape of their comb. Since this shape is stable the bees will leave a bee-space along all edges of the comb rather than connecting it to the walls of the hive. The combs can then easily be removed for manipulation or harvesting. The top-bars have the same, into Langstroth equipment, for instance to strengthen a broodnest, for those beekeepers who maintain both types of hives.

In contrast to the Langstroth hive, a great amount of additional paraphernalia is not necessary. The Langstroth hive requires an extractor for the profitable harvest of honey. In addition, at harvest time, extra hive bodies are necessary for transporting harvested frames to or from the extraction house. Alternately, if whole supers are to be removed from the hives, equipment to drive the bees out of the supers must be obtained. Comb from the KTBH is simply cut from the top-bars at the apiary and placed in buckets or other covered receptacles; later the honey is extracted by squeezing. No specialized equipment is necessary. The Langstroth system maximizes honey production through high capital investment and at the expense of wax

production. The KTBH, on the other hand produces wax and, by all accounts, an equivalent amount of honey in the tropics (because simpler more frequent harvests can be made) at a greater labor input (and in the developing world labor is a very low-cost input).

In a large part of the developing world the technology of the Langstroth standard-frame hive is used only nominally. Most beekeepers in the income supplement. Advanced management such as queen-rearing is virtually unknown, in many regions, and even basic techniques such as brood nest manipulation and the centrifugal extraction of honey are often understood and employed only little. Rural extension programs, whose thrust is usually developed in urban, national headquarters by personnel who have little field experience, often attempt to encourage "modern" equipment, meaning Langstroth hives (the KTBH is, in fact, about 100 years more modern as Langstroth made his discovery of the bee-space and incorporated it into his hive design in 1851(3)). The misguided rationale is, "If they use 'em in the U.S. they must be the best". However, cultural and environmental conditions call for beekeeping of a substantially different flavor from that familiar in North America. The promotion of Langstroth equipment and all its accoutrements is often inadvisable because economic resources at the rural level are at a much higher premium than manual labor. Often what is warranted in developing, tropical countries is another technology, one that is easier to use and less costly to obtain and maintain. Such a system is available in the Kenya top-bar hive.

To illustrate, the price of a honey extractor can easily exceed the yearly income of a rural farmer. (For instance, in Paraguay, from whence I write, a brand-name extractor costs the equivalent of almost three hundred dollars <$275.00>, a simpler locally made model can be had for about sixty <$60.00> ; nonetheless a field laborer earns only about a dollar per day and most small-scale farmers earn less than two hundred dollars <$200.00> annually.) I have encountered countless small-scale beekeepers who prefer cutting the comb from the frames rather than investing in an extractor-- which effectively invalidates any advantages that the Langstroth system has over the KTBH.

To construct the KTBH requires the purchase of little or no building materials and a minimum of carpentry skills. The hive can be built using scrap or rough lumber, may be woven from cane

or reeds, formed from cement blocks or adobe, or may even employ old, discarded oil drums for the hive bodies. Even when such hives are constructed by a second party and purchased by the beekeeper the cost per hive is usually less than half the purchase price of a Langstroth frame-hive. (Again in Paraguay, the price of two Langstroth bodies and frames is about twenty dollars <$18.00> ; a KTBH-- equivalent in size to two, deep hive-bodies-- can be had for less than four dollars <$4.00> .)

Although developed in Kenya the KTBH offers advantages in many parts of the developing world, most specifically in Latin America, where I have worked in apicultural development for several years. The relatively recent complication added in the Americas by the spread of the African bee is addressed by features of the KTBH. Because the beekeeper exposes only a small part of the colony at a time, when working the KTBH, it is much easier to control the bees than it is with Langstroth equipment, the design of which allows bees to fly up from all combs at once.

The shape of the hive allows it to be hung conveniently off of the ground. Hung at about waist-height the hive is comfortably manipulated from behind without having to bend or squat. Hanging the hive off the ground also affords protection from predators such as toads, scorpions and, especially, ants, a major pest in the tropics. If hives are hung beneath trees the hives are, naturally, shaded-- facilitating the work of both bee and beekeeper. Heat stress of hives is of major importance in the tropical lowlands and one that is all too frequently overlooked (4). If hives are properly protected from intense sun the bees will be able to get about the business of collecting nectar to feed the hive instead of water to cool it-- thus increasing yields.

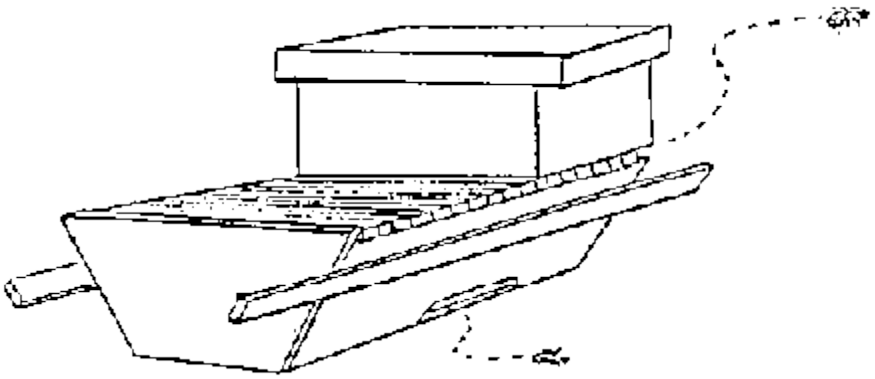
Perhaps even more importantly, shading makes the bees less irritable, hence facilitating harvests(5) (I have known beekeepers to abandon Langstroth apiaries, and the honey stored there, after "africanization" had occurred because the bees had become too defensive to manage with the Langstroth equipment they had used with The low cost per hive for the KTBH also benefits beekeepers with African stock. It is the norm in many regions of the tropics for African bees to abscond from their hives during periods of nectar dearth. This is especially true when Langstroth frame hives are used because frame hives afford less protection from sun, pests and predators, additional inducements to abscond(6). The resulting migration from the hives often results in the loss of fifty percent (and in some cases one hundred percent!) of colonies from an apiary(7) during the dearth. If Langstroth equipment is used this represents a substantial stagnation of capital that might otherwise have been invested elsewhere.

Vacant Kenya top-bar hives (from which bees are less likely to abscond anyway) can easily be put to other uses during the dearth period-- as grain cribs, feeding troughs, wash-tubs for clothing or children, etc. Following the dearth period, during the swarming season, the KTBH's can be replaced in the apiary as "bait hives" to catch passing swarms or to shelter divisions made from existing hives. This ensures that precious capital is in use all year In addition, because the harvesting of the KTBH is a relatively simple undertaking that does not require the use of an extractor, smaller, more frequent harvests are possible. Therefore, honey can be produced earlier in the season, when prices are higher, thereby increasing the economic production of the KTBH as compared to the Langstroth. Anecdotal evidence and personal experience indicate that a KTBH will produce a honey yield quite comparable to that of the Langstroth hive (with a higher labor input-- but, again, in the developing world labor is usually a low-cost input). In the third world, where wax substitutes are not so common as they are in developed countries, there is a considerable market for beeswax (beeswax candles are used extensively for both simple lighting and religious occasions in many parts of Latin America,

for instance). Given that the KTBH also produces a much greater quantity of wax the economic yield per hive per year is usually **greater** than for the Langstroth system and at a **lower initial investment.**

A comparative study of actual economic production per hive for both systems would be very useful in apicultural extension programs in the developing world.

It should not be limited to one or the other but should be determined by the knowledge and economic means at the disposal of the beekeepers. The Kenya top-bar hive is more appropriate for beekeepers who have cheap labor at their disposal and the Langstroth system is more appropriate for beekeepers who can invest a greater amount of capital. There are many people in the world who could keep bees successfully but who do not have the necessary investment capital to buy into a Langstroth system. Their ultimate choice is the KTBH or not to keep bees at all. Then the Kenya top-bar hive is the best hive.



The KTBH can also be supered by removing one or more of the top bars and placing a standard Langstroth super (with frames) on top of the box.

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