

Sweet harvest: beekeeping

People have collected wild honey throughout history. For thousands of years, they have also encouraged bees to nest in hives so that collecting honey is easier. Beekeeping is a useful sideline activity for many farm families. The presence of honey bees also ensures optimal pollination and thus increases the quality and yield of nearby crops. Nicola Bradbear advises on appropriate equipment for small-scale beekeeping.

Nicola Bradbear

Honeybee species differ in size and behaviour. The most widely used bees are European *Apis mellifera*. Tropical Africa also has native *Apis mellifera*. They are slightly smaller, more readily alerted to sting, and more likely to abandon their hives if disturbed. In some areas, bee colonies migrate seasonally.

In Asia three native tropical species are commonly found: *Apis cerana*, *Apis dorsata* and *Apis florea*. *Apis cerana* can be managed in hives. The other species cannot, as they build a single comb in the open. But honey-hunters still plunder their combs for honey.

In the Americas, where there are no native honey bees, European *Apis mellifera* colonies were introduced. Then some African *Apis mellifera* queens were brought into Brazil. Their offspring proved dominant over the European bees. These "Africanised" bees have spread through much of South and Central America. They have many tropical African characteristics, which have required changes in beekeeping management practices but have also led to increased yields.

Traditional beehives

A beehive is any container for bees to nest in. The purpose is to encourage them to build their nest in such a way that it is easy for the beekeeper to manage and exploit them.

Traditional hives are made of local materials, typically hollowed-out logs, bark formed into a cylinder, clay pots, woven grass or cane. The bees build their nest inside the container, just as they would in a naturally occurring cavity. Eventually the beekeeper plunders the nest for crops of honey and bees' wax. Bees may be killed during this process. If the colony is destroyed, the hive remains empty for a while. If there are many honeybee colonies in the area, a swarm may settle in the

empty hive and start building a new nest. Traditional beekeepers often own 200 hives, and expect only some of them to be occupied by bees at any time.

Movable-frame hives

The aim of using movable-frame hives is to get the maximum honey crop with least disruption of the bee colony. Rectangular wood or plastic frames are used to support the bees' combs. These frames allow inspection and manipulation of colonies, eg. moving frames from a strong colony to strengthen a weaker one. They allow efficient honey harvesting because the honeycombs, within their frames, can be emptied of honey and then returned to the hive. This allows increased honey production as the bees' resources are saved in building fresh comb.

Frame hives must be built with precision. The spacing between the frames must be the same as in a natural nest. Frames are contained within boxes. Each hive consists of a number of boxes placed on top of each other. Often the bottom box is used as the brood chamber. Between this and the box above it, a "queen excluder" is placed: a metal grid with holes of such a size that worker bees can pass through but the queen cannot because she is larger. This ensures that only honey is stored in the boxes above the queen excluder.

Frame-hive equipment should not be used unless the infrastructure exists for making it locally. As frame hives require well-seasoned timber, planed and accurately cut, as well as other materials like wire, nails and foundation, they are expensive to make.

Low-technology hives

To gain the advantages of frame hives (manageability, efficient honey harvest) without the disadvantages of high-cost manufacture, low-technology hives have been developed. Bees are encouraged to build their combs from the undersides of a series of topbars. The beekeeper can then use these topbars to lift individual combs from the hive. The hive can, like a traditional hive, be constructed from local materials. Such hives can be kept near the homes. This means that also women can fit beekeeping into their day-to-day activities. The hives can be moved between crops as they flower successively.

The only items which need precise construction are the topbars, because they must provide the same spacing of combs in the hive as the bees would use in their natural nest. This spacing depends on the species of bee. As a general rule, African *Apis mellifera* need 32 mm and *Apis cerana* need 30 mm. The best way to deter-

aping by smallholders

mine the right width is to measure the spacing between combs in a wild nest of the same bees.

Other equipment

A beekeeper uses a "smoker" as a source of cool smoke to calm the bees. This is a box with smouldering fuel (dried cow dung, hessian or cardboard) with a bellows attached. The beekeeper puffs a little smoke near the entrance of the hive before it is opened, and gently smokes the bees to move them from one part of the hive to another. Smokers can be made by village blacksmiths.

Adequate protective clothing gives beginner beekeepers confidence, but more experienced beekeepers find that too much protective clothing makes it difficult to work gently with the bees, and it is very hot. A broad-brimmed hat with some veiling protects the head and neck from stings. Some people protect their hands with plastic bags secured at the wrist with a rubber band. Rubber bands also prevent bees from crawling up inside trouser legs or shirt sleeves. Light-coloured clothing is best, as bees are much more likely to sting dark-coloured clothing. The clothing (basically modified overalls) can be made locally.

Bees tend to close up every gap and seal every joint in the hive with a sticky substance known as propolis. Hive tools are handy pieces of metal used to prise boxes apart, scrape off odd bits of wax, separate frame-ends from their supports etc. An old knife can be used for this, but knife blades tend to be too flexible and give insufficient leverage. Village blacksmiths should be able to produce a suitable implement by copying an imported hive tool.

Harvesting honey and wax

Honey is harvested at the end of a flowering season. The beekeeper selects those combs which contain ripe honey, covered with a fine layer of white wax. These are usually the outside-most combs. Combs containing pollen or developing bees are left undisturbed.

The honeycomb can be simply cut into pieces and sold as fresh, cut comb honey. Or it can be broken up and strained through a filter such as muslin to separate the honey from the wax.

The comb is made of wax. After the honey is removed, the combs can be melted gently (over water) into a block. As wax does not deteriorate with age,

beekeepers often save scraps of it until they have a large enough amount to sell. Bees' wax can have many local uses, eg. in the lost-wax method of brass casting, as a waterproofing agent to strengthen leather and cotton strings, in making candles, and in hair and skin ointments.

Bees' wax is also on demand on the world market. Groups of beekeepers can combine their wax to have enough to sell. Bees' wax for export should be clean and heated as little as possible. Little processing is needed: it can be moulded into blocks and placed in hessian sacks for export. Much of the wax on the world market is exported from Africa.

What equipment is chosen?

Attempts to assist beekeeping in any area should start with the existing bees, techniques and equipment. The local bees will have evolved to survive efficiently under the prevailing conditions. Beekeepers will not be helped by introducing equipment which is not suitable for local bees and requires unfamiliar management techniques.

In many cases, beekeepers need help not so much with their beekeeping as with transport to get their honey to the market and containers for marketing it effectively. But they may also find protective clothing, smokers and hive tools useful. In considering how to improve beekeeping, the following factors should be taken into account:

- If beekeeping is being promoted as a sideline activity (honey-hunting or small-scale low-technology beekeeping), then equipment should be of a type which can be manufactured and serviced at village level.
- The spaces between combs, the dimensions of combs and nest volume in conventional movable-frame equipment and the associated strategies for bee man-

agement have been developed for European bees. Much time and effort has been wasted trying to manage tropical bees in the same type of hive and by the same methods.

- During the last two decades, bee disease has increased greatly around the world, mainly because of movement of bee colonies and used beekeeping equipment by people. There are few remaining regions without introduced honeybee diseases, and most of these are in developing countries. If these countries want to retain their stocks of disease-free bees, they must ensure that bees and used beekeeping equipment are not imported.
- It can be helpful to import (new, unused) basic equipment (protective clothing, smokers, hive tools) to serve as prototypes leading to local manufacture.

Making a start

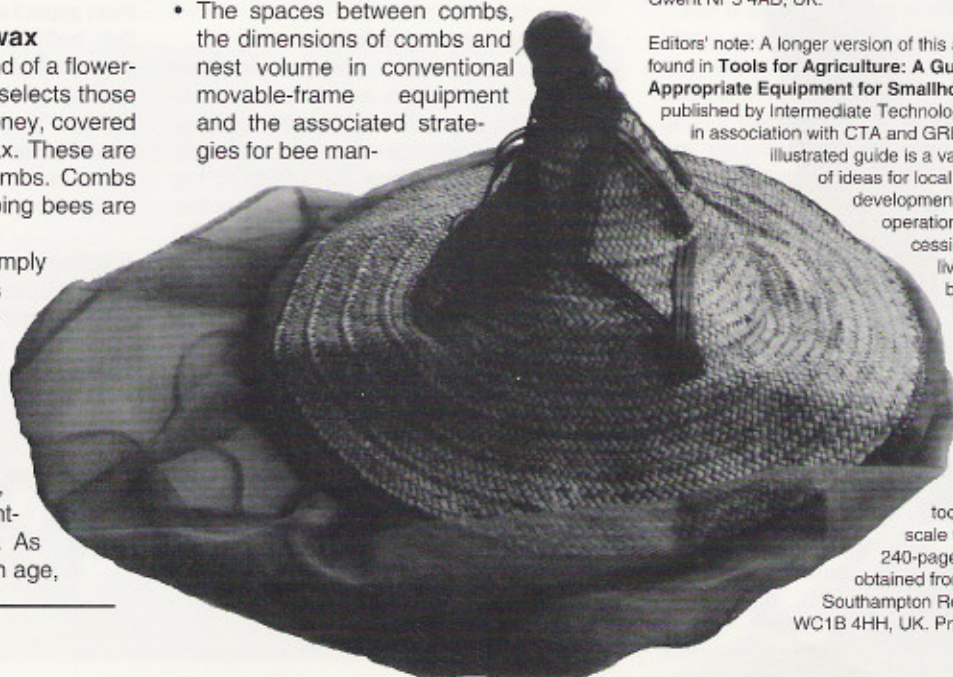
A good way to start beekeeping is by transferring a colony from the wild into a hive. The wild colony will already have some combs and these can be carefully tied onto the topbars of the hive. Another way is to set up a hive, perhaps rubbed inside with beeswax to give it an attractive smell, and wait for a passing swarm of bees to occupy it.

One of the best ways to get started is with the assistance of a practising local beekeeper. If you do not know of any locally, then write to the author at the address below and she will try to help you. Many basic texts give advice in bee management, but most relate to frame-hive beekeeping using European bees.

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Editors' note: A longer version of this article can be found in **Tools for Agriculture: A Guide to Appropriate Equipment for Smallholder Farmers**, published by Intermediate Technology Publications in association with CTA and GRET. This well-

illustrated guide is a valuable source of ideas for local technology development for cropping operations, crop processing and storage, livestock husbandry, water lifting, transport and beekeeping. The introduction to each section gives guidelines for choice of appropriate tools for small-scale farming. The 240-page book can be obtained from ITP, 103-105 Southampton Row, London WC1B 4HH, UK. Price: £30.



Beekeepers' hat with veil.