



Eva Crane Trust

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Beekeeping requires little financial input, time or land. It provides extra, non-perishable food and a cash income. Eva Crane examines the possibilities.

BEELINES FOR DEVELOPMENT

Four characteristics of developing countries make them suitable for apiculture. First, almost all lie in the tropics and subtropics, where the climate is warm enough for bees to forage all the year round, and a dearth period due to drought or heavy rainfall is shorter than the winter dearth period at higher latitudes. Secondly, many tropical areas—even dry ones—produce a wealth of flowering plants that yield nectar from which bees can produce honey but which may otherwise be wasted. Thirdly, the honeybees evolved in the tropics (although some are able to live successfully in temperate zones and can survive quite severe winters).

Finally, the whole region—about half the world's land area—is one where beekeeping can be expanded, and in some areas quite dramatically, whereas this is no longer true of most of the temperate regions. At least 145 developing countries are currently interested in extending and improving their beekeeping.

Sub-tropics profit

Large-scale beekeeping tends to be most profitable in the subtropics. Modern methods of hive management were developed in the temperate regions, especially in USA and Canada, and in general they can be adapted to the subtropics and often give better yields there, because of the long season. These methods are not so adaptable to the full tropics, for reasons explained below.

In 1981 the total world honey production was 877,000 tonnes, of which 207,000 tonnes were exported. The net exporting countries are listed in table 1 with the number of tonnes exported in 1981. The countries are grouped according to the zone in which they are mainly situated.

Almost all the exported honey goes to temperate-zone countries, four of which account for 84 per cent of it.

German Federal Republic	74,723
Japan	24,468
USA	35,071
UK	16,800
tonnes	<u>151,062</u>

Figures vary from year to year, but the general pattern remains the same. The most dramatic change has been the ascendance of China, which did not export honey at all

until the mid-1950s. Other developing countries that are known to have exported honey in recent years include Belize, Kenya, Jamaica, Niue, Tanzania, Tonga, Uganda.

The prominent position of subtropical countries is clear from the figures quoted. Countries of the full tropics are mostly in an early stage of exploiting their full capability, and could probably increase their honey production to 20 or 50 times its present level, or even more.

Honey exports earn hard currency. In general they can be achieved only where honey can be produced more cheaply than in importing countries. Low production costs are linked with a high honey yield per hive. In Germany and the UK yield per hive is 10-25 kg but it is a hundred kg or more in exporting countries. Factors such as labour

costs and transport are also involved.

Exporting honey involves organization by or of the beekeepers concerned, and the use of management methods which yield honey that meets the stringent requirements of importing countries. But in many countries of the full tropics and subtropics, exporting honey should only be the *final* step in beekeeping development. Especially in the poorer countries, beekeeping has other important functions which are more easily attainable. It provides:

- extra (non-perishable) food for the peasant farmer and his family, and an extra sweetener for their staple diet;
- surplus crops—honey and beeswax—from which the farmer can obtain a cash income;

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Table 1 Number of tonnes of honey exported in 1981

Temperate zones	Subtropics	Tropics
USSR	China	Guatemala
Canada	Mexico	El Salvador
Hungary	Argentina	Dominican Republic
Australia	Cuba	Brazil
Bulgaria	Chile	Honduras
Spain	Israel	Costa Rica
New Zealand		
Greece		
Czechoslovakia		
Total exports		
45,278	128,306	6,701



Beekeeping in Mexico. Shade is very important in the dry season.

- pollination of agricultural, horticultural and tree crops over a wide area.

Beekeeping is a family-level exercise, and has distinct advantages over other agricultural activities.

- It requires very little financial input, as the costs of traditional equipment, stock maintenance, and processing of the crop, are minimal.
- It needs little land (50 hives can be accommodated in a tenth of a hectare), and the land can be of poor quality.
- It is a flexible occupation; it can be undertaken by both sexes, and by people of virtually any age, and the commitment to it can be variable. It might begin as a spare-time occupation using simple methods, and then lead on to a full-time occupation using more sophisticated and more profitable methods as money becomes available.
- Finally, beekeeping, like the honeybee itself, does not compete for resources with any other agricultural activity—it is a true bonus.

A few hives of bees often provide a poor-

ly paid peasant farmer with more income than his main occupation—which he can continue, since a hive of bees needs only a few hours' attention each year.

In the Old World (Africa and Asia, as well as Europe) there have for many centuries been traditions of harvesting honey, either from primitive hives or from nests of wild bees in trees and rocks. So the population is well accustomed to honey, which is much valued as a food. In tropical Asia it is also used as a medicine, and in tropical Africa for making honey beer. In the New World (the Americas and Australia), there were no native honeybees but the tropical regions support a number of species of stingless bees (Meliponinae), and honey has traditionally been harvested from the nests of these bees, living wild or in containers that served as hives.

Some knowledge of the bees available for apiculture in different parts of the developing world is important in assessing both the beekeeping potential, and certain dangers attendant on introducing other bees.

The native habitat of the honeybee *Apis mellifera* is Europe, the Middle East and the whole of Africa. In Europe, different 'races' have evolved which have characteristics appropriate to the environment in which they evolved, and which can be combined by selective breeding. Farther south, in the eastern Mediterranean region, the indigenous honeybees are more vigorous in defending their nests, because they have to counter attacks by hornets and other enemies. They also form smaller colonies, which store less honey: in the subtropical climate, the short winters mean that colonies have no need to amass honey stores to last 5 or 6 months.

South of the Sahara these same characteristics are intensified. Tropical

African honeybees also have a third behaviour pattern, one which makes beekeeping more difficult. When food resources fail, the whole colony may leave its nest or hive and fly to an area within reach where new plants are coming into bloom, and build a new nest there. This type of migration is not a characteristic of bees in European winters, since it is too cold for them to fly, and the area without food sources is extensive.

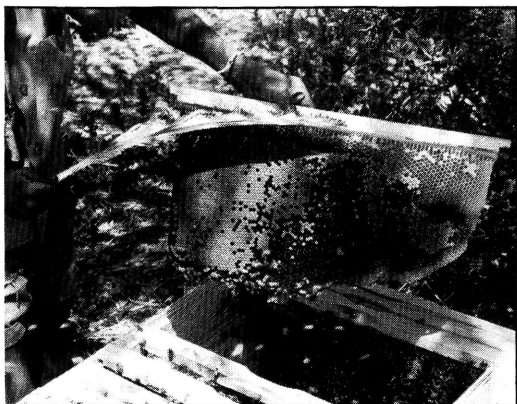
In tropical and subtropical Asia there are three honeybee species: *Apis cerana*, *Apis dorsata* and *Apis florea*. The first is like *Apis mellifera*, but it is smaller, builds combs with correspondingly smaller cells, and stores less honey. Like *Apis mellifera*, it nests in a dark cavity, and can thus be kept in a hive. This cannot be done with *Apis dorsata* (the largest of the honeybees) and *Apis florea* (the smallest), because they build a nest consisting of a single comb, in the open air—attached to the branch of a tree, an overhanging rock, or similar structure. The tradition in much of Asia has been to hunt for wild nests containing honey, rather than to keep bees in hives. This is still the way in which *Apis dorsata* honey is harvested, and the yields from its colonies are the largest.

Bees spread

When European bees were introduced to countries of the New World in the 1600s to 1800s they flourished. Attempts have also been made to introduce them in tropical Africa, as a replacement for the 'aggressive' native honeybees. These attempts have not been successful because the behaviour patterns of European bees are not adaptable to the environment. In 1956 tropical African honeybees were introduced to the American tropics, at one place in Brazil. They were much better adapted to the tropical American environment than were the European bees already there, and they have now spread throughout most of South America. They are the same species as the Europeans and therefore interbreed with the bees already present, but in most characteristics they are genetically dominant.

One characteristic that has enabled these 'Africanized' bees to colonize such a large area is that swarms will nest in much smaller cavities than European bees would accept. In the Colombian Andes at about 2000 m, I saw a number of concrete standards (used for electric power transmission) that had been occupied by swarms, although the entrance hole led to quite a small cavity inside.

In 1982 the Africanised bees arrived in Panama, and they are expected to move further northward still. In the American tropics the Africanized bees are better honey-getters than European bees, but they migrate (which has helped their rapid spread), and they are easily alerted to sting, so that a large number of bees can home in on a site where one bee has left her sting odour—hence the 'mass attacks' reported in the press.



More primitive hive with moveable combs but no frames in use in Botswana. A feather is used to brush the bees off the honey comb.



B. Clausen

The modern hive, of which the commonest type is the Langstroth, consists of a number of similar boxes open top and bottom, that are tiered one above another. Each box holds 9 or 10 frames suspended on two runners like files in a suspension filing cabinet, in which the bees build their combs. Below the bottom box is a floor-board incorporating a flight entrance for the bees, and above the top box is a protective roof. The bottom box or boxes constitute the brood chamber, where the queen lays eggs, the brood is reared, and the bees store pollen. Boxes are added above the brood chamber for honey storage, according to the bees' capacity to fill them, and this depends largely on the honey flow. Honey is not stored continuously, but only when the main nectar-yielding plants are in flower.

Examining colony

A common operation in hive management is examination of the colony in a hive—separating the boxes so that the brood chamber can be inspected to check that the queen's performance is satisfactory, to look for signs of any disease, and according to the season, to look at each frame to find any queen cells—a sign of swarming preparation. Appropriate action must then be taken, which may involve relocating a number of frames and hive boxes. During such an operation many bees will be flying around the hive—and the beekeeper—but he is protected by a boiler suit and veil, and is only likely to receive an occasional sting into his clothing or hands.

The tropical bee *Apis cerana*, which is rather gentle, can be managed similarly, although—except with the larger strains in temperate-climate high Himalayan valleys—it is not possible to develop large and very productive colonies. With the single-comb Asian honeybees, hive management is not needed, although much could probably be done to make the honey harvesting easier by arranging suitable 'apiaries' where colonies were congregated.

It is the tropical African bee—and the Africanized bees in South and Central America—that present the greatest challenge with regard to management. Since 1956 much attention has been paid to the problem in the Americas, due largely to concern in the USA that the Africanized bees will reach that country and disrupt beekeeping there. They have already covered two-thirds of the route.

In handling colonies of these bees, it is necessary to minimise the number of bees flying—especially round the operator—when the hive is opened. Bee houses have been used, with hives inside along the walls, their flight entrances giving access to the open air. The house is fitted with vents so that, when hives are opened inside the building, flying bees can get out but cannot re-enter. Bee houses are, however, expensive and certainly beyond the reach of small-scale farmers. A more widely applicable approach to the problem is the use

of a long horizontal box hive with only one tier of combs, perhaps 30 altogether; the honey is stored at either end and the brood nest is in the middle. Since the bees do not need to have access to an upper hive box, top-bars of frames can be extra wide so that they touch each other. Bees cannot escape from the opened hive except through the narrow gap left when each comb in turn is removed for examination. Gentle smoke is applied continuously along this gap. The long shallow box can have parallel long sides, or these may slope inwards, in which case frames are unnecessary, and combs built freely from top-bars will not be attached to the hive sides. Such top-bar hives can be made relatively cheaply.

Traditionally hives are made from local materials that are to hand, such as mud, clay, reeds or grasses, woven wicker, or hollowed logs. They cost the beekeeper nothing if he makes them himself, as is the custom. In general, much more attention needs to be paid to the production of hives that are more effective for their purpose, but still cheap.

One difference between beekeeping with modern and with traditional hives, that is not always appreciated, is the amount of beeswax produced. Modern beekeeping suppresses beeswax production by providing wax comb foundation and using the same combs year after year, so that the beeswax yield is only 1½ to 2 per cent of the honey yield. In traditional beekeeping, bees build all their combs, often annually, and beeswax is extracted from the honey combs harvested. The beeswax yield is then likely to be around 8 per cent of the honey yield, and most of the beeswax on the world market comes from traditional hives. It is a second nonperishable cash crop for the beekeeper, and beeswax blocks are easily transported for sale.

Learning more

What has been said only touches the fringe of the subject, and because beekeeping offers a real opportunity for many men and women in developing countries to add to their food and income, some information is given below on ways of learning more about bees and beekeeping.

Apiculture or beekeeping has a great potential for expansion and improvement in the tropics and subtropics, whereas in the temperate zones it is already much more fully exploited. At the simplest level beekeeping can provide peasant farmers with extra food and cash. As a large organized industry in subtropical countries, notably China, Mexico and Argentina, it already provides the bulk of the honey exports on to the world market. There are many stages between these two extremes, and beekeeping can be fitted in with other work, since bees need rather little attention. In different countries the management of bees is similar in principle, but differs in important details, and it is vital to have knowledge about what is needed, if the best returns are to be achieved.

R. A. Morse



***Apis dorsata* comb from a tree in the Philippines. The branch has been cut off and the bees removed to show the unusually compact brood nest.**

The International Bee Research Association (IBRA), Hill House, Gerrards Cross, Bucks, SL9 0NR, UK, has on its staff an Information Officer for Tropical Apiculture, funded by the Overseas Development Administration. Specific enquiries may be sent to her, and she can, for instance, provide the address of a contact in almost any developing country from whom more direct help may be expected. A *Newsletter* is issued free of charge. Also IBRA has published or collaborated in a number of books and leaflets designed to help apiculture in developing countries; all can be purchased from IBRA and many are available free of charge to addresses in developing countries. Some recent examples are given below and details can be obtained from the address above. *Source Materials in Apiculture*. Series of 10 leaflets on such subjects as obtaining beekeeping supplies, where to get training in beekeeping, where to apply for grants, what books are available, and what plants are worth growing for honey production.

Bibliography of Tropical Apiculture in 24 parts, containing about 4000 references; also 14 *Satellite Bibliographies* with a further 2500 references.

Technical Cooperation Activities: Beekeeping. A directory and guide. The directory has entries under 85 countries, and IBRA has 130 relevant feasibility studies and reports. The guidelines cover feasibility studies and project recommendations, and summarise apicultural and economic factors.

Apiculture in Tropical Climates. Report of the First International Conference in this series, in 1976.

Apiculture and Honey Production in the Developing Countries of the Tropics and Subtropics. Book commissioned by FAO to be published in 1984 in English, French and Spanish editions.

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