

## Sustainable Beekeeping Development in Karnataka

*Nicola Bradbear\* and M.S. Reddy\*\**

\* Bees for Development, Troy, Monmouth, United Kingdom

\*\* Apiculture Section, Directorate of Industries & Commerce, Government of Karnataka, Bangalore, India

Karnataka is a large coastal state in south-west India. Good forage sources for bees are found throughout the region. Best are the forested areas of the Western Ghats providing excellent forage and habitat for bees. The coastal strip is also good with coconut and soap-nut providing major nectar flows. The plains of north-eastern districts support intensive agriculture, especially sunflower, and offer excellent potential for beekeeping. Periods of nectar flow vary throughout the state. Many of the major food crops provide useful pollen and/or nectar forage, and include coffee, areca nut and coconut, maize, pulses, sunflower, fruits and vegetables.

The Karnataka Government's department with responsibility for beekeeping is the Directorate of Industries and Commerce (DIC). In 1994, DIC requested FAO (United Nations Food and Agriculture Organisation) for assistance to promote apiculture as a source of income generation amongst landless farmers. In previous years beekeeping with the indigenous honeybee *Apis cerana* had become difficult due to a virus disease. It was proposed that one way to overcome this difficulty was to introduce the European honeybee, *A. mellifera*, and promote its use amongst landless farmers. In 1996 FAO agreed to support a Technical Co-operation

### Honey sources and beekeeping prospects in Bangalore district

V. Sivaram

*Century Foundation, Bangalore, India*

Survey and identification of plants of apicultural importance were carried out during 1993–96 in Bangalore district, Karnataka, India. The area is rich in both agricultural and non-agricultural flora. The availability of many diversified bee flora greatly supports large-scale beekeeping in Bangalore district. The survey revealed that there were 19 nectar plants, 101 pollen plants, and 166 both pollen and nectar plants. A floral calendar was devised. Results indicate that the time and duration of flowering of bee flora were highly variable. The floral calendar suggests that Bangalore district is potentially rich in bee flora and has good honey potential. Data on beekeeping and bee-management practices in Bangalore district suggest that beekeeping is underdeveloped and unproductive. Factors responsible for poor beekeeping practice, and a strategy to encourage beekeeping are discussed.

Programme to assist with beekeeping in the state, providing funds for DIC's proposal entitled 'Beekeeping for landless farmers in Karnataka State'. When the project commenced in December 1996, an important priority was that

activities should be sustainable: beekeeping must be feasible and self-supporting, not reliant on external support.

### Analysis of the Beekeeping Situation

#### Personnel and administration

Apiculture falls within the jurisdiction of DIC. There are over 130 apiculture staff, five Beekeeping Training Centres and many further apiary sites. Each centre has staff with full-time responsibility for apiculture, and additional technical staff.

#### Training, extension and information provision

Apiculture staff have received training in apiculture, but this is mainly theoretical. Every government apiary lacks a practical demonstration of beekeeping. Consequently training given by extension staff focuses on theory rather than practical skills.

The state offers assistance to beekeepers in terms of provision of training, usually including a stipend, bee boxes (either free of charge or subsidised) and tool kits (hive tool, smoker, veil, etc.). Bees are not usually provided; the new beekeeper collects them from the wild. There are seven schemes funded by the state offering this type of assistance. They are implemented through Zilla Panchayats (local government). There are also Government of India schemes.

Great efforts have been made to help people start beekeeping, but there is no follow-up assistance because practical beekeeping skills are lacking and extension staff do not have access to transport or appropriate allowances. Lack of technical information is a serious constraint. World-wide beekeeping is becoming more difficult as bees and their diseases are introduced to new areas. International research is moving rapidly, and Karnataka beekeepers must not be isolated from opportunities to stay abreast with developments.

#### Apicultural practices

An important finding of an analysis of the existing beekeeping situation was that 50–90 % of all honey is collected from wild colonies of the rock bee, *Apis dorsata*. This fact is not revealed in official documents (DIC, 1996). Honey-hunters, who collect from the wild, are barely regarded by extension staff as part of the 'apicultural community'. In interviews, honey-hunters said they received no assistance from the extension service. One of their main problems is in gaining access to state forests. Auctions are conducted to sell the rights for honey-hunting, and this can make the activity non-economic. It also means that honey-hunters are forced to be secretive.

Keeping colonies of *A. cerana* in wooden movable-frame hives, known here as 'box hives', is the style of beekeeping that has been promoted within India for the past 80 years. All official documents and beekeeping programmes relate to this style of apiculture. A typical harvest from *A. cerana* in box hives in Karnataka is 5–8 kg per year. However some beekeepers routinely obtain yields of 20 kg or more (Olsson, 1995).

Before box hives were introduced, *A. cerana* was kept in clay hives and log hives. These methods are still used although it is difficult to know to what extent they are practised. The extension service is so focused on box hives that staff seem reluctant to admit, or perhaps are not aware of, the continued existence of other methods. One beekeepers' co-operative estimated that 25 % of their 1724 shareholders still use traditional hives. Traditional hives yield 3–5 kg of honey per year. These yields are low relative to those potentially obtainable from frame hives. However, many beekeepers in Karnataka harvest similar amounts of honey from their frame hives as they could have harvested from much cheaper clay hives. A beekeeper could have 20 clay hives for the cost of one box hive. The economy, simplicity and sustainability of traditional methods should not

be underestimated. The low-cost of simple methods is likely to make them more economical on a small-scale than more sophisticated beekeeping. There could be a market for honeycombs produced by simple beekeeping. Well-presented and marketed as a pure, traditional product they could achieve a premium price.

Frame-hive beekeeping has been promoted in Karnataka within only the last 20 years or so. It is understandable that there are still relatively few people with skill in managing bees to their full potential in these hives. Further training and information materials are needed for apicultural staff, extension workers and beekeepers. *Apis mellifera*, the European honeybee, has been brought to Karnataka. The total number of *A. mellifera* colonies is probably less than 1000. These stocks have been obtained from various other Indian states (Punjab, Haryana). Many of these colonies are small, docile and easy to handle.

### Marketing of Honey and Beeswax

Poor marketing is a major constraint. A rapid way to assist honey-hunters and beekeepers would be to ensure they derive more profit from their products.

### Impact of Thai Sac Brood Virus Disease (TSBVD)

This is a disease caused by a virus that kills the brood of *A. cerana*, and ultimately leads to colony death. TSBVD was first identified in Karnataka in 1992. Official documentation states that '75-90 % of bee colonies in the southern parts of Karnataka have been wiped out' (DIC, 1996). However it is not clear how these figures have been derived. It is difficult to assess the actual impact of TSBVD for the following reasons.

- Until 1995 beekeepers were paid Rs 50 compensation for every colony lost to TSBVD. There was therefore an incentive to state that colonies had been lost.

- One of the effects of TSBVD is that it causes the colony to abscond. However there are many other factors that will cause *A. cerana* to abscond. Many trainees have been given boxes and bees, but do not have the practical skills to manage them. When the colonies are stressed in one way or another the bees will abscond. Yet all absconding colonies are said to have TSBVD. During field visits it was evident that skilled beekeepers had more colonies than unskilled, who claimed to have lost all their colonies because of TSBVD. Even among extension workers, TSBVD has become a useful excuse for every colony absconding due to lack of proper care.
- There is no field survey of numbers of colonies before and after the arrival of TSBVD.

Disease-tolerant colonies are now appearing. Extension staff have no programme to identify and increase stock from such colonies, and therefore increasing colony numbers has been slow. Extension staff and beekeepers are unaware of management methods that enable *A. cerana* beekeeping to continue in the presence of TSBVD. Overseas training for a few trainers, provision of relevant literature, and the development of an effective extension programme could help people to manage *A. cerana* and alleviate problems caused by the disease. There is a shortage of *A. cerana* colonies. In general neither extension staff nor beekeepers have the skills to make sufficient increase in bee stocks from native bees. Extension staff cannot practise queen-rearing. This means that recovery from TSBVD has been slower than necessary.

### Pesticides

It is likely that honeybee populations are being seriously harmed by pesticides used extensively in Karnataka. Farmers and beekeepers need to know ways of avoiding pesticide-killing of bees. Policy is needed to provide compensation for beekeepers whose colonies are destroyed in this way. However the most effective way to prevent

harm to bees is to increase awareness amongst both farmers and beekeepers, and increase communication between interested groups.

#### Other honeybee diseases

The present disease situation in Karnataka, compared with much of the rest of the world, is actually good. Many common bee diseases have not yet been recorded and seem not to be present. Policy and awareness are needed to maintain this situation. European Foul Brood Disease, caused by the bacterium *Melissococcus pluton*, is currently reported in introduced *A. mellifera*.

#### Introduction of *Apis mellifera*

It was proposed that the present project should focus on the introduction of *A. mellifera*. However, this should only be done if it will generate more income for a significant number of the poor people that this project aims to assist. The following reasons mitigate against its introduction.

#### *Survival of Apis mellifera*

The DIC imported 90 colonies of *A. mellifera* in March 1996. Some of these have died already, and those surviving are in a weak state. None has so far generated honey surpluses greater than can be obtained from *A. cerana*. This beekeeping cannot be promoted to farmers until feasibility is established and management methods are well determined.

#### *Support service*

The extension service is at present unable to deliver the additional technical skills, and cope with the additional problems presented by beekeeping with *A. mellifera*.

#### *Economics*

Given correct management it may be possible to keep *A. mellifera* in such a way that significant quantities of honey and beeswax are generated (especially in north-eastern districts). The input costs will be greater because *A. mellifera* is an exotic species from a temperate climate, and will require more resources (time, treatment against

endemic diseases and predators). It is already well-known from other Asian countries that beekeeping with *A. mellifera* can be more productive than with *A. cerana* only when practised on a large-scale. Since the aim of this project is to assist landless farmers, introduction of *A. mellifera* is unlikely to be of assistance to this sector.

#### *Disease*

*Apis mellifera* will present new problems for extension staff and beekeepers: (a) because of indigenous diseases to which it will be susceptible; and, (b) because of new diseases it may introduce. Sadly some of the colonies already in the state have brought in European Foul Brood Disease. This is typical of the increasingly complex disease situation that will accompany introduced *A. mellifera*.

#### *Existing constraints*

The proposal to introduce *A. mellifera* aims to increase income generation by increasing honey production. Yet shortage of honey is not seen as a constraint to the industry: plenty of low-cost honey is available from honey-hunting. Constraints to the current apiculture industry are the effect of TSBVD, pesticides, and poor marketing of products. None of these constraints will be addressed or alleviated by the introduction of *A. mellifera*.

#### *Environmental issues*

Evidence from other regions of Asia suggests that large-scale introduction of *A. mellifera*, where high populations of this species are maintained by beekeepers, can lead to loss of indigenous bee species. As well as the inevitable competition for food resources, there are also the risks of disease introduction, especially viruses. Loss of honeybee species leads to loss of pollination of plant species, and therefore loss of diversity. All of these concerns suggest that great caution must be exercised in the introduction of *A. mellifera*. Numerous scientific apiculture meetings have passed resolutions to this effect.

### *Beekeepers' needs*

There is no strong request arising from beekeepers to introduce *A. mellifera*, and indeed many state that they do not want the exotic species. Some beekeepers have observed that it does not thrive. They have noticed that during the rainy period it ceases foraging while *A. cerana* continues, also that it is more susceptible to predators. It is mainly extension staff who have heard that *A. mellifera* is a 'better bee' and quote honey production of 30 kg per colony. This is stated without consideration of whether lack of honey production is a limiting factor.

Considering all of the above, there seem to be no compelling reasons for further introduction and promotion of *A. mellifera* in Karnataka at present. A more worthwhile use of project funds is to address the underlying reasons that led to the proposal to introduce *A. mellifera*.

In summary, constraints to beekeeping can be summarised as follows: lack of technical skills; lack of technical information; marketing; diseases; shortage of *A. cerana* colonies available to farmers; pesticides; and access to forests.

### **Project Activities**

The best assistance with long-term benefit is to make beekeeping a worthwhile, profitable activity. The project is endeavouring to achieve this by alleviating the constraints listed above.

### **Research**

As a start it is recommended that the University of Bangalore establishes a functioning demonstration apiary with at least 50 *A. cerana* colonies. Using these bees the National Expert can begin to provide practical advice to beekeepers on economic beekeeping, prevention of absconding and overcoming the recurring effects of TSBVD.

### **Training**

DIC personnel responsible for apiculture and agricultural extension workers need practical apiculture training. Important aspects include

the management of *A. cerana*, TSBVD control, colony multiplication, and ways of generating income from the products of apiculture. DIC staff are being given opportunities to see other successful beekeeping practises and be kept up-to-date in their field. They are participating in training courses at the Bee Development Research Centre in Vietnam, and in courses in beekeeping and queen-rearing in *A. cerana* run by the Central Bee Research and Training Institute, Pune. Following this, a Training of Trainers Programme is being organised for all apiculture training staff.

### **Extension**

Extension must provide practical skills. The project is establishing seven strong, functioning demonstration apiaries, and maintaining high populations of bees for supply to farmers. It is also providing information and equipment to beekeeping centres to assist with their extension efforts. Excellent methods for beekeeping extension must be developed and evaluated. Following the Training of Trainers programme, a new extension programme will be devised.

### **Policy**

Policy must be determined and implemented concerning the importation of bees, disease control, honey marketing, access to forests, and pesticide use.

### **Development of the industry**

Efforts will be made to increase populations of *A. cerana*. Apiculturalists will be encouraged to generate more income by selling their honey in more profitable ways. Honey-hunters should be assisted by the extension service and by support for their industry.

### **References**

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