CHAPTER 1

Introduction

Honeybees are social insects with which man has established a harmonious coexistence. These insects have provided humanity with the very basis of civilization because of their highly evolved social behaviour and being the source of the earliest sweet food and trade commodity. Besides, honeybees provide free ecosystem services in the form of cross-pollination and propagation of several cultivated and wild plant species, thereby maintaining biological diversity. They, therefore, not only boost crop productivity but also help in the conservation of forests and grassland ecosystems and save several botanical sources from extinction.

There are at present, four or more species of honeybees in the Hindu Kush-Himalayan region. Among these, *Apis cerana* F., *Apis dorsata* F. /*laboriosa* and *Apis florea* F. are native, whereas an exotic European honeybee, *Apis mellifera* L. has been introduced in some Hindu Kush-Himalayan regions recently. All the native bee species in this region, have been extensively exploited by honey hunters since ancient times. Native *Apis cerana* resemble *Apis mellifera* in many biological and economic characteristics and like other livestock, both these species have been domesticated for honey production and pollination purposes. Other two species, *Apis dorsata*/*laboriosa* and *Apis florea* are found in wild state and so far all attempts to domesticate them have failed.

Apiculture (beekeeping) has been closely linked with the cultural and natural heritage of the rural people and mountain ecosystem, respectively. It is an important resource base of mountain farming systems and offers specific advantages for developing sustainable agriculture. The most important aspect of beekeeping is that it is an important income-generating activity in the hills for small and marginal farmers, landless labourers, and other weaker sections of the society living at, or below subsistence level. Hive products such as honey, beeswax, royal jelly and pollen provide both nutritious food and cash

income. These are in demand both locally and for the export market. Yet another significant, but not widely recognized role, is that honey bees enhance the productivity levels of agricultural, horticultural and fodder crops through cross-pollination and thus provide important linkages to these farming systems.

In the Hindu Kush-Himalayan region, temperate (high hills and interior valleys), sub-temperate (middle hills) and sub-tropical (low-lying hills) have a thriving beekeeping industry. Great strides in modernizing beekeeping with the native and exotic honeybee species are being made. Beekeeping has not yet developed on modern scientific lines to the extent it has in the temperate zones of advanced countries. However, in the temperate mountain parts of China and India, efforts have been made to improve traditional methods of beekeeping with native *Apis cerana*, and in certain such areas, this native bee species matches the European honeybee, *Apis mellifera* in honey production and pollination activities. China at present is one of the major producer and exporter of honey and other hive products in the world. Similarly, Himachal Pradesh in northern India has taken the lead in south and southeast Asia in utilizing honeybees, in temperature fruits orchards for pollination purposes, to boost yield and improve quality. Such success stories can be encouraging for other mountain areas where initiative efforts are being made to develop beekeeping on modern scientific lines.

The Hindu Kush-Himalayan region, offers great potential for beekeeping development due to the ideal climatic conditions and diversity of bee floral resources available throughout the year. However, due to constraints such as lack of basic infrastructure, skilled manpower, training, extension facilities or basic and applied research programmes, the situation is far from satisfactory. The biological and economic potentials of native bee species have so far remained unexplored. Some of these native bee species are on the verge of extinction in the Hindu Kush-Himalayan region because of the traditional honey-hunting method, and the introduction of allopatric European honeybee, *Apis mellifera*, and declining habitat. As a result of this, irreversible damage is being caused to both the flora and fauna of this region because honeybees are an important component of the mountain ecosystems. Introduction of exotic *Apis mellifera* may have unfortunate ramifications because of this species allopatric nature, susceptibility to diseases, parasites and predators, different bee flora and high cost technology for operation.

Chapter 1 gives an overview of the apiculture status in this region. Chapter 2 deals with beekeeping as an important non-land based income and food-generating sustainable resource base of mountain farming systems with positive ecological consequences only. Special

attributes of apiculture with regards to mountain specificities and constraints of human interventions for the promotion and development of beekeeping in developing countries of this region are discussed. Chapter 3 on apiculture and integrated rural development lays special emphasis on creating awareness among the policy makers and planners in different Government and non-Government organizations and international donor agencies regarding the role of beekeeping in solving the numerous and serious economic, nutritional, ecological and social problem of rural communities living at or below the subsistence level. Chapter 4 on apiculture and mountain crop productivity discusses the role of honeybees as one of the most effective and cheapest biological input by way of cross-pollination in increasing the yield and quality of different agricultural and horticultural crops. Harmful effects of biocides on honeybees are also discussed. An approach to the apiculture status, economics and profitability for different target groups (marginal, small, medium and commercial scale operations) in the Hindu Kush-Himalayan countries is made in Chapter 5. Chapter 6 covers different technological levels starting from the honey hunting state, which has given way to traditional beekeeping with fixed comb hive and how the latter has been wholly or partly replaced by modern beekeeping with movable frame hives. Chapter 7 describes the production technology and marketing potentials of different hive products such as honey, beeswax, royal jelly, pollen, propolis and venom along with their nutritional and medicinal uses. Chapter 8 on honeybee resources fills the longstanding need for a review on biology and management of Asian hive bee, *Apis cerana*. The problems and prospects of introducing the exotic European honeybee, *Apis mellifera* into the Hindu Kush-Himalayan region are also discussed at length. A comprehensive account of honey plant resources along with floral calendars and their linkages to social forestry especially in the Hindu Kush-Himalayan region, is given in Chapter 9. The last Chapter 10, gives the summary, conclusions and recommendations for the promotion and development of beekeeping in the developing countries of the Hindu Kush-Himalayan region.