

Expert Meeting Discussions

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For three days in late June, 1989, more than 50 leading bee biologists, economists, horticultural experts, development planners, representatives of international funding agencies, and other professionals, participated in an International Expert Meeting on Apicultural Development under the auspices of ICIMOD, HMG/Nepal, and FAO. In accordance with their different professional backgrounds, the speakers approached the topic from many directions. However, the central theme remained the role of apiculture in sustainable mountain agriculture.

— In this chapter on Expert Meeting Discussions, are summarized the salient issues raised during the presentation of papers and ensuing discussions.

The Mountain Perspective and Beekeeping

Mountains have several special characteristics that differentiate them from other regions. The important ones among them are inaccessibility, fragility, marginality, diversity, niche (comparative advantage) and people's adaptation experiences. The significance of these mountain characteristics, in relation to the development of apiculture in the Hindu Kush-Himalayan region, was one of the main topics of discussion. It was noted that, in comparison to all other land-based activities, apiculture faces less constraints because of features such as inaccessibility, fragility, and marginality.

Furthermore, other mountain characteristics such as diversity, niche, and people's adaptation experiences are more conducive to apiculture. This Expert Meeting also observed that constraints such as

severe climate, high altitude, non-availability of honeybee genetic resources, and honey plant resources do not limit beekeeping development programmes in the region. Certain constraints such as poverty, remoteness, transport, travel problems, and neglect of native bee genetic resources, to some extent hamper development and promotion of beekeeping. Problems such as deforestation, soil erosion, and degradation of watersheds are other factors responsible for the loss of the natural habitats of honeybees and decline in bee floral resources.

Honeybee Resources

The Hindu Kush-Himalayan region is the richest in the world from point of view of bee resources. There are at present four different species of honeybee in this region. Among them, *Apis cerana*, *Apis dorsata/laboriosa*, and *Apis florea* are native, whereas the European honeybee, *Apis mellifera*, has been introduced in some countries of the region. There was a lot of discussion on whether *Apis mellifera* should be introduced in a country such as Nepal where traditional beekeeping with *Apis cerana* is widespread. There was general agreement that introduction of the exotic, *Apis mellifera*, in northern India, the North West Frontier Province of Pakistan, and Thailand is now the basis of flourishing apicultural industries. This exotic bee species produces three times more honey than the native, *Apis cerana*, and is more suited to modern bee management technology. However, many importations of the exotic, *Apis mellifera*, have proved disastrous because of its allopatric nature, the introduction of new diseases, and parasitic mites.

There was general apprehension that the importation of *Apis mellifera* would lead to the extinction of the native, *Apis cerana*. This process of extinction is almost complete in Japan, and has already commenced in China where the number of *Apis cerana* bee hives has declined from 100,000 to 30,000 only. In certain mountain areas of the North West Frontier Province of Pakistan, *Apis cerana* populations are likely to decline to a level that is no longer viable. Such extinction would not only have a serious negative impact on the income level of farmers, living at or below subsistence level, but would also cause serious impairment or partial loss of essential ecological services such as, cross-pollination and propagation of several cultivated and wild plant species. Furthermore, apiculture with the exotic, *Apis mellifera*, requires high cost technology which the farmers living at, or below, subsistence levels in mountain areas cannot afford.

The native hive bee, *Apis cerana*, has many valuable characteristics of biological and economic importance which have not been scientifically explored. This native bee species is being replaced by the

exotic, *Apis mellifera*, because of its frequent swarming and absconding habits and also because of its lower honey yield. However, these negative traits in the native bee species can be improved through selective breeding and by adopting suitable management practices. There exists a great genetic diversity in this native bee species in the Himalaya. Two sub-species and five different geographic populations have already been identified in the Indian Himalaya. Genetic diversity in this native bee species should however be explored for the entire Hindu Kush-Himalayan region. Such information will provide excellent opportunities for the genetic improvement of this species by selective breeding.

Beekeeping for Sustainable Mountain Crop Productivity and Honeybee Forage

The sustainable development of mountain agriculture in the 21st century will necessitate a reorientation of the present crop production technologies. Instead of making substantial use of chemical fertilizers, biocides, irrigation facilities, and heavy machinery for yield enhancement, a shift towards biologically-based agriculture, which includes increased photosynthetic efficiency, biological nitrogen fixation, genetic engineering, efficient nutrient uptake, and biological cross-pollination is necessary. At the Expert Meeting, one such technology became an interesting topic for discussion—enhancement of the productivity levels of different mountain crops through cross-pollination by honeybees.

From the different papers presented, it became clear that cross-pollination of entomophilous crops by honeybees is one of the most effective and cheapest methods of increasing yield and improving the quality of seed and fruit produced. The vital role that honeybees play in enhancing the productivity levels of mountain crops such as temperate fruits, vegetables, oils, fodder, and spice seeds has often been underestimated in the Hindu Kush-Himalayan countries. As a matter of fact, bee pollination researches carried out in western countries reveal that the main significance of honeybees and apiculture is in cross-pollination, whereas hive products such as honey and beeswax are of secondary value.

In the Hindu Kush-Himalayan region, Himachal Pradesh in northern India has taken a lead by adopting a planned bee pollination programme as one of the essential inputs for improving the quality and yield of temperate fruit crops, particularly apples. However, in other temperate areas, it has not been adopted as an integral part of mountain crop production technology, despite the fact that all these hilly areas have rich apicultural traditions. The main reasons for this are ignorance and lack of technical know-how on the part of agricultural extension agencies and farmers.

Nectar and pollen from flowering plants are the raw materials of beekeeping. It is important to know about the honey plants in a particular area for the production of surplus honey, to increase the carrying capacity of a particular area in terms of the number of bee hives it can sustain, and to meet slack season needs during the winter. Most of the papers presented during this Expert Meeting revealed that the Himalayan region has very rich and diverse bee flora, such as temperate zone fruits, vegetable crops, agricultural crops, grasses, bushes, shrubs, forests, and avenue trees. There were also detailed discussions on the continuous decline in bee floral resources in the Hindu Kush-Himalayan region due to the degradation of forests and grassland ecosystems as well as changing agricultural patterns.

In order to improve the situation, it was recommended that honey plants should also be included wherever new planting programmes are initiated. Some efforts, made in the past in this direction, have yielded satisfactory results. For example, roadside plantations in Pakistan, social forestry programmes in northwest India, and community forestry plantations in Nepal included several multipurpose plant species which included bee forage plants also. As a result of this, apiculture has flourished in these areas. For commercial apiculture, it may not be possible to have enough bee flora available in one particular locality, so beekeepers are migrating their colonies from one place to another in order to exploit the floral resources fully throughout the year and harvest additional honey crops. The most successful examples of such migratory beekeeping practices are in the North West Frontier Province of Pakistan, Himachal Pradesh, and the Kashmir region (northern India).

There are still a large number of indigenous plant species in the Hindu Kush-Himalayan region, and the potential from an apicultural point of view has not been fully tapped. So, instead of encouraging the introduction of exotic plant species for bee forage, which involves risks of one kind or another, emphasis should be laid on the preparation of detailed floral calendars, based on local flora, for each potential beekeeping area.

Mountain Women and Beekeeping

In the overall socioeconomic perspective of the Hindu Kush-Himalayan region, women are the most neglected and underprivileged group. One of the important tasks for future policy planners must be the integration of the underprivileged sections of mountain women into the economic life of the whole rural population. This integration is possible through full utilization of underutilized resources. One such resource,

is apiculture. It offers great potential for raising the socioeconomic status of rural mountain women.

Projects to encourage women apiculturists are essential, because the work is not heavy and women can easily perform all the hive management operations. Apiculture provides flexibility in terms of time, gainful employment close to home, nutritional benefits for children, and financial independence for housewives. It broadens the food base of rural communities and is an excellent sweetening source, particularly in the hills where sugar cane is not grown. The Asiatic hive bee, *Apis cerana*, is gentle in temperament and much easier to handle than the European honeybee, *Apis mellifera*, and is ideal for the woman entrepreneur.

Status and Economics of Beekeeping

Apiculture is an old traditional household activity for mountain farmers. All over the Hindu Kush-Himalayan region, it has been linked with the cultural heritage of the people as a sustenance oriented activity. From the point of view of mountain characteristics, apiculture offers several advantages, varied possibilities, and great opportunities to a developing economy. It is different from other developmental activities because it has only positive ecological consequences. Apiculture can be taken up both at the household and commercial levels to generate additional income and employment.

Beekeeping with the native hive bee, *Apis cerana* in the Hindu Kush-Himalaya has not yet developed along the modern scientific lines which are followed in the cold climatic zones of advanced countries. In the temperate parts of China and India, efforts have been made to improve the traditional methods of beekeeping with *Apis cerana* and in certain such areas, this native bee species matches the European honey bee, *Apis mellifera* in honey production and pollination activities. However, in other countries of the Hindu Kush-Himalaya, the situation is far from satisfactory, despite the fact that climatic conditions, and multiplicity of flora available throughout the year, in the temperate and sub-tropical parts of this region, offer great potential for beekeeping development. The major constraints are lack of basic infrastructure, skilled manpower, training, extension facilities, or basic and applied research programmes. All attempts to introduce *Apis mellifera*, into this temperate region have met with little success. The largest and most valuable species of honey bee, *Apis laboriosa*, is on the verge of extinction in the Hindu Kush-Himalayan region because of traditional honey-hunting methods.

Economic analyses, carried out in Hindu Kush-Himalayan countries, revealed that, as a small cottage industry, beekeeping with *Apis*

cerana, required only low cost technology and even the poorest person could engage in this with very little support. On a commercial scale, apiculture with the exotic *Apis mellifera*, does require higher investments, but there is a wide margin of profit, besides full exploitation of the temporal and spatial diversity of mountain floral resources that would otherwise go waste.

There are no standard methods available for economic studies on apiculture. Economic studies reported in the Expert Meeting were mainly by bee specialists and not by economists. Thus, they were based on data from pilot projects and personal experiences. The level of profits at the farm level may not be that high, as indicated in these studies. Also, in these studies, the indirect benefits of honeybees as pollinators of cultivated and wild plants were not quantified. Thus there is a need for systematic studies of the economics and profitability of apiculture for different target groups in the mountain areas of the Hindu Kush-Himalayan region. Such studies will help in determining the potential apicultural area and the potential value of apicultural development for the mountain people.

Beekeeping Training and Research

The ecological resources of the Hindu Kush-Himalayan region offer great potential for the development of beekeeping. Due to the ideal climatic conditions and the diversity of bee and floral resources, this region can be converted into a land of honey, provided there is adequate original planning on the part of policy-makers as well as continuing commitment to the programmes.

The lack of basic knowledge of *Apis cerana* biology is a major constraint in developing appropriate apiary management technology with this native bee species. Very little is currently available in literature covering this subject compared to volumes of material specific to *Apis mellifera*. As a result several national and international development projects for the promotion of beekeeping with this bee species in the developing countries of Asia, which attempted the application of European honeybee, *Apis mellifera*, apiary management technology on *Apis cerana*, ended in failure. *Apis cerana* shows striking differences to *Apis mellifera* in certain biological traits such as colony cycle, foraging, temperature regulation, colony defence, aggressiveness, absconding and swarming. Some of these act as negative behavioural traits from a practical beekeeping point of view. For example, frequent swarming and absconding by *Apis cerana* especially during honeyflow seasons, lead to decline in colony strength and adversely affect honey production and pollination efficiency. There are no such problems in beekeeping with *Apis mellifera* and it is easier to get surplus honey from

this bee species. However, these negative traits in *Apis cerana* are amenable through research efforts. This scientifically neglected bee species has the potential to match *Apis mellifera* in economic usefulness. Many studies, especially in India, have demonstrated the ability of *Apis cerana* to pollinate a wide range of agricultural crops. Further studies on the biology and behaviour of this bee species will lead to better exploration of its honey production and pollination efficiency.

At the Expert Meeting, it also became obvious that different international funding agencies have focussed their attention on tropical and sub-tropical apiculture and have ignored the potentials in temperate hill regions, such as the Hindu Kush-Himalaya, for the development of this important enterprise. It was noted that in the hilly regions of India (Kashmir and Himachal Pradesh) and China, modern methods of apiculture have been adopted and basic infrastructural and technical know-how also exist. However, in other countries of the Hindu Kush-Himalaya, apicultural development programmes are still facing teething problems. Several countries in this region do not have the extension and training facilities, or basic and applied research programmes for the advancement of apiculture. At present, scattered efforts being made for the promotion of the industry, with the Asiatic species of honeybee, by different national and international agencies, have not yielded the desired results.

It was unanimously agreed that a coordinated effort is required to correct the situation. For this, an International Centre for Apicultural Research and Training should be established in the region. The primary objective of this Centre should be to generate and deliver improved apicultural management technology through research and training, primarily on the Asiatic species of honeybee. It was also agreed that Nepal would be an ideal host country for such a Centre. Keeping in mind the fact that ICIMOD covers all of the *Apis cerana* countries, it would provide a suitable platform from which to take initiatives for the establishment of the International Centre for Apicultural Research and Training.