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21

Honeybees : Harbinger of Sweet Revolution

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NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI

August 2025

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Preface

India with diverse climate, crops and flora offers vast scope for the expansion of beekeeping and promoting it as a component of sustainable agriculture production systems. Its tropical and sub-tropical climate, prevailing across most parts of the country, provides favorable conditions for the year-round production of honey and other hive products. Besides, enhancing crop yields through cross-pollination, honeybees contribute significantly to biodiversity conservation by facilitating the reproduction of numerous plant species, both cultivated and wild, across the agricultural landscapes and forest ecosystems.

The apiculture holds tremendous commercial potential. In addition to honey, a variety of other hive products, such as beeswax, bee pollen, bee bread, royal jelly, propolis, and bee venom significantly expand the potential and economic scope of apiculture. Apiculture plays a transformative role in fostering inclusive rural development and provisioning sustainable livelihoods, particularly for small and marginal farmers, landless agricultural workers, and rural households. Hon'ble Prime Minister's mission of doubling the farmers' income and his pledge for sweet revolution provided a huge impetus for the development of beekeeping in the country with the launch of National Beekeeping and Honey Mission in 2020. However, research and development of beekeeping in India has not received much needed attention.

This strategy paper is based on the outcome of the discussion held during a workshop organized by the Academy for the overall improvement of apiculture in the country. I appreciate the Convener (Dr. S.C. Dubey), Co-Conveners (Prof. Pardeep Kumar Chhuneja & Dr. Sachin Suresh Suroshe), Reviewers (Dr. D.P. Abrol & Dr. H.C. Sharma) and Editors (Dr. V.K. Baranwal & Dr. R.K. Jain) for their efforts in bringing out this paper.

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(Himanshu Pathak)
President

Honeybees : Harbinger of Sweet Revolution

1. INTRODUCTION

India with its diverse agro-climatic conditions, crops, and fauna has huge potential for promoting beekeeping as a component of sustainable agriculture production systems. Tropical and sub-tropical climate, prevalent in most parts of the country, is congenial for year-round production of honey and hive products.

The real momentum for commercial and industrial-scale apiculture in India began in 1976, marked by the release of the highly productive and widely adaptable Italian honeybee (*Apis mellifera ligustica* Spinola) by Punjab Agricultural University, Ludhiana. Since then, apiculture has witnessed an exponential growth trajectory. This rapid advancement can be attributed to the unique comparative advantages it offers over other agro-based or subsidiary enterprises, as it does not necessitate land ownership or built infrastructure, making it highly accessible to small and marginal farmers as well as landless agricultural laborers. It is an inclusive occupation, suitable for individuals from diverse backgrounds. Financial support in the form of subsidies has given the adoption of beekeeping an impetus. Recognizing honeybees for pollination supportive role as an important input in increasing crop productivity has led to embracing a good part of apiculture for the support under the frame-work of Ministry of Agriculture (MoA) in 1994, which further gave Indian apiculture a huge fillip. Subsequently, the establishment of the National Bee Board under MoA in 2006 and support to farmers for adopting beekeeping under the National Horticulture Mission provided a significant boost to apiculture development.

India accomplished a remarkable milestone by operating dedicated 'Honey Trains' from Ludhiana to Mumbai, exclusively for honey export-an exceptional initiative carried out once in 2009 and twice in 2011. As a result of these initiatives along with large scale development of manufacturing, packaging and trade, honey export picked up fast all over the country and contributed towards realizing the 'sweet revolution'. Honorable Prime Minister's mission of doubling the farmer's income and his pledge for sweet revolution further provided impetus for the development of beekeeping in the country by establishing National Beekeeping and Honey Mission in 2020. In the backdrop of above and the Beekeeping Development Committee recommendations by the Economic Advisory Council to the Prime Minister (EAC–PM) (Anonymous, 2019a & b), the Academy organized a Strategy Workshop to bring out the constraints in apiculture development.

2. CURRENT STATUS OF INDIAN APICULTURE

With rapid advancement in apiculture, India has recently made a significant impact on the global stage, securing the position of the second largest honey producing country in the world after China. In 2022, India produced approximately 1,33,000 tons of honey. However, in terms of honey export, India ranked fourth in 2022, recording an export value of USD 229.3 billion, accounting for 78.7% share of global exports. During 2022-23, India exported 79,929.2 tons of honey to 76 countries for ₹1,62,277.4 lakh (APEDA, 2023a & b). The honey market in India was valued at ₹23.3 billion in 2022, which is expected to grow at a CAGR of 8.4% to ₹38.8 billion by 2028 (ITC Trade Map, 2023).

Consumption of honey in India, however, has been dismally low, as it could not acquire the status of a regular food item on the dining table. It has still been largely known as natural medicine. Per capita annual consumption in India is calculated as 37.1 g. The largest honey consumers in terms of total volume are : China, USA, Turkey, Iran, Germany, Russia, UK, Japan, France, Spain, Poland, Canada and Italy in decreasing order. The largest per capita per annum consumers are : Turkey (1.3 kg), Canada (1.14 kg), Germany (1.0 kg), Iran (1.0 kg), USA (0.7 kg) and Russia (0.42 kg) (FAOSTAT, 2023).

3. EMPLOYMENT AND LIVELIHOOD GENERATION POTENTIAL

In India, Apiculture is restricted to honey production and compulsive bees-wax production. Apiculture, subjected to favorable marketing conditions, is a dependable source of livelihood as subsidiary occupation or as an independent enterprise. According to the National Bee Board (NBB), as on August 2022, there were 12,699 registered beekeepers in India who collectively managed approximately 1.934 million honeybee colonies. As per Khadi and Village Industries Commission (KVIC) (as quoted in a Press News, 2019), India was having 0.25 million beekeepers managing 2.5 million bee colonies. These estimates underscore the significant role of unregistered beekeepers in India's apiculture sector, comparing the registered beekeepers, the actual number, including unregistered practitioners, is substantially higher. Given the significant unregistered segment, there's a clear need for more comprehensive data collection and registration efforts to better understand and support the beekeeping community in India.

As per estimates, every 10,000 honeybee colonies generate direct and indirect employment opportunities for approximately 1,500 individuals and apiculture, thus, holds a great livelihood promise. As per NBB, the country need s 200 million colonies for meeting Indian pollination requirements and accordingly, it would provide employment to 30.9 million people.

Beyond honey, apiculture yields a range of high-value hive products such as pollen, propolis, royal jelly, bee venom, and beeswax, making it a multifaceted enterprise.

In addition to core beekeeping activities, the sector stimulates a wide array of allied industries and services.

4. HONEY AND OTHER HIVE PRODUCTS AND THEIR USAGE

Honey, besides natural sweetener, is an energy elixir and preservative, while in India, it finds its maximum use in Ayurveda and as medicine for cure of common human ailments. It is known for its antioxidants, antibacterial, antifungal, and healing properties, in boosting immunity, for digestion, gut health, sore throat and brain benefits. It is also reported as useful in weight management, nourishing skin and face, boosting memory, natural home remedy for dandruff, and natural sleeping aid. Elsewhere in the world, its high consumption has been owing to its usage as a food, including confectionery, bakery and wine industry that makes it a premier hive produce.

In addition to honey, a variety of other hive products such as beeswax, bee pollen, bee bread, royal jelly, propolis, and bee venom (BV) significantly expand the potential and economic scope of apiculture (Krell, 1996). Depending upon the quality and package size, over the globe, the beeswax price varies between ₹230-1,600/ kg; bee pollen between ₹400-7,000/ kg; royal jelly between ₹2,200-32,000/ kg; propolis between ₹1,300-9,500/ kg and dry bee venom between ₹5,000-22,000/ g. These bee and plant derived substances, elaborated by honeybees, are utilized across the multiple industries.

5. APICULTURE FOR APITHERAPY

Europe and many other countries like South Korea, China and Japan have made advances in apiculture and are now leaping towards apitherapy including its various components, e.g. the honey massage (renowned for its numerous therapeutic and wellness-enhancing effects), bee venom massage, aerosol therapy, ulleotherapy (uleterapia), venom based botox, etc. BV is being administered in several ways: Puncture with whole bees (in non-specific or in specific points and zones); Micropuncture with the BV stinger; Injections with pure and sterile BV; Apipuncture/ apiacupuncture (apitoxinreflex therapy); BV ointments, creams, pills, drops; *Apis* homeopathic preparations, and ultra-sound based Phonophoresis.

6. APICULTURE FOR POLLINATION

The role of honeybees in crop pollination is well known, owing to their floral constancy and floral fidelity traits. Insect pollinators contribute USD 163 billion towards the global agricultural food production through pollination (Khalifa *et al*., 2021). In USA, about two million colonies every year are put under rental hiring system for the pollination of almonds, apples, blueberries and melons and bees are estimated to contribute USD 15 billion through cross pollination services. In Canada, 55,000-75,000 colonies are

annually put under rental hiring system for Canola pollination, and in Quebec State alone, 35,000 honeybee colonies are rented out for blueberries and 15,000 for apple pollination. In UK, bees have been estimated to contribute £ 630 million and in EU, the figure has been estimated at € 22 billion. In India, Chaudhary and Chand (2017) reported that of 211 crops, 51.2% are dependent on animal pollination, and further direct contribution of insect pollination to Indian agriculture is 8.72%, monetarily estimated at ₹1,12,615.73 crore (USD22.52 billion), with additional spill over benefits like increased quality, seed production, breeding efficiency etc.

In India, with rising awareness among crop growers, there is increasing demand for bee colonies for apple in Himachal Pradesh and Jammu & Kashmir, and for Pomegranate, Drumstick, Onion etc. for fruit bearing and/or seed production in Maharashtra.

7. HONEYBEE DIVERSITY FOR APICULTURE

India is the house of 755 honeybee species, including five *Apis* species. Among the well known *Apis* honeybee species all over the globe (8), Indian subcontinent is habitat for five species, while all other continents except Asia have only one in the form of *A. mellifera.*

8. RECOMMENDATIONS

To unlock the full potential of the Indian apiculture sector, it is imperative to implement a set of well-conceived, evidence-based, and forward-looking measures. The following strategic recommendations are critical to fostering inclusive, sustainable, and innovation-driven development of apiculture, thereby positioning it as a vital pillar of India's agri-rural economy, ecological resilience, and bio-enterprise ecosystem.

- ✦ Establishment of a National Apiculture and Pollination Research and Training Centre under Indian Council of Agricultural Research along with State Apiculture Development Boards or Apiculture Directorate at the state level.
- ✦ Promotion of apiculture at the school level, certification/elective courses at the graduate level and specialization in apiculture at the post-graduate level for wider dissemination of knowledge and facilitating the enhancement of domestic market demand for honey and other hive products, including apitherapy modules and utilities.
- ✦ Strengthening of research on high yielding and high-end quality oriented hive products, production techniques/ processes, and their harvest and post-harvest management, including the technologies for their primary and secondary processing. Bee biodiversity needs to be mapped across the country to resolve taxonomic ambiguity.
- ✦ Assessment of regional, floral, temporal and seasonal bee biodiversity, flora on their migratory routes, development of diagnostic kits and devising eco-friendly management practices for common insect pests and diseases.

- ✦ Establishment of honey adulteration detection centers with required infrastructure along with adequately trained human resources in all major honey producing states, and more specifically in recognized honey niche regions.
- ✦ Promoting and supporting manufacturing industry in scaling-up fabrication of standard honeybee hives and other apicultural equipment, infrastructure facilities at state level for collection, processing and storage of honey. Developing FSSAI (Food Safety and Standards Authority of India) standards for hive products of Indian niches. Exploring Geographical Indication (GI) tag for special honeys.
- ✦ Developing a robust system for promotion of practicing apitherapy, facilitating its integration into health and wellness practices while ensuring adherence to safety standards and clinical efficacy. Promotion of bee-friendly pesticides label claim for their use on bee floral plants
- ✦ Provision of incentives to beekeepers, Farmer Producer Organizations (FPO's) and traders for export of honey. Promotion of honey production may be linked with incorporating honey as a nutritional supplement in the Mid Day Meal Scheme.
- ✦ The Insurance Regulatory and Development Authority of India (IRDAI), under the Ministry of Finance, should be mandated to design and promote apiculture friendly insurance schemes that cover exigencies such as loss of bee colonies due to floods, windstorms, fires, pest outbreaks, transit-related accidents during migratory operations, and thefts.
- ✦ Capacity building for various apiculture stakeholders and establishing Apitourism Centres.

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