

# AICRP on Honey Bees and Pollinators: Four Decades of its Existence

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All India Coordinated Research Project on Honey Bees and Pollinators was initiated based on the recommendations of National Commission on Agriculture constituted by Government of India during 1976. In recognizing the importance of the Honey bees in economic empowerment and increasing the crop productivity research project on Honey bees under the ambit of Indian Council of Agricultural Research was recommended by the commission. AICRP on Honey Bee research and Training was commissioned by the council in 1981 with its headquarters based at Central Bee Research and Training Institute, Pune. Five State Agricultural universities involved in bee keeping research at that time inducted under the coordinated research project. The AICRP on Honey Bees and Pollinators network expanded gradually over the years with addition of the new centers to cover the different agro-climatic zones of the country. Project Coordinating Unit was shifted to Chaudhary Charan Singh Haryana Agricultural University, Hisar during 1987 and subsequently to Division of Entomology, IARI during September, 2014 for better administration and coordination with ICAR Headquarters. At present, the project has 18 regular funded and 7 voluntary research centers involved in conducting region specific basic and applied research in on different aspects of bee keeping and also actively engaged in extension by organizing basic and advanced

training programmes. The total sanctioned manpower of the project was 64 including 28 Scientist posts and 29 technical and administrative posts. However, the total sanctioned strength was reduced to 48 during 2018-19.

The research activities during the initial years of the project mainly focused on the documentation of the floral resources and development of the floral calendars for the expansion of migratory bee keeping. To revive the bee keeping industry *A. mellifera*, an exotic species was tested for its performance by the coordinating centers and the species was extended to suitable states/areas. Most of the honey produced now comes from this species and has given great impetus to beekeeping development in the country. The preliminary data on the pollinator diversity and quantifying the role of the pollinators in major cross-pollinated crops on priority to know about the pollination and pollinators deficiency. The toxicity of the most widely used insecticides was evaluated for calculating the loss of bee population and crop production. The observations on biological parameters of *Apis mellifera* and the optimum time for division and multiplication of *Apis cerana indica* are relevant still today. Package bee technology was developed and used widely for the introduction of *Apis mellifera* to new areas.

Most challenging phase for the project was sudden outbreak of *Thai sac brood virus* in Indian bee colonies during 1990s. Poor diagnosis and lack of validated disease control measures took a heavy toll of *Apis cerana* bee keeping in northern and southern parts of India. Almost 95 per cent of the *Apis cerana* colonies were lost within a span of two years. Bee keeping with *Apis cerana* was revived with the dedicated efforts of AICRP (HB&P) centers through adoption of dequeening and requeening technique to manage this deadly disease and selecting, multiplying as well as distributing disease resistant stocks. Preventive and curative control measures were worked out for greater wax moth, nosema, *Vorroa* and *Tropelaelaps* mites. Nationwide long-term disease survey and surveillance programmes were started for monitoring the incidence of major pests and diseases to keep a vigil on any such major outbreaks. Multiple cropping systems were evaluated for their honey production potential. Etiological factors for many the newly recorded maladies in managed bees were identified.

The volatility of honey export markets during 2000-2005 prompted for development of the technologies for the extraction and processing of products other than honey from bee hive. Efforts are made to increase the productivity of hive products through standardization of technologies for production of bee venom, propolis and royal jelly. pollen traps, propolis screen and mass queen rearing technologies were developed and tested through multi location trials under the project for their usefulness. The merit of the technologies developed by AICRP (HB&P) centers is that they are cheaper and cost effective. Potential of these technologies in diversification bee keeping enterprise is enormous. Importance of honey

bees in pollination and quantification of yield increase in 38 crops has been worked out and documented, so far. Colony stocking rates for managed pollination of crops have been recommended based on scientifically validated trials for different agro-climatic zones. Pollinator diversity studies on different cropping systems provided first hand information diverse pollinator assemblage of different crops and their potential contribution in crop pollination.

Exploration and conservation of alternative pollinators *i.e.* other than true honey bees become a major research theme area of the project during 2005-2010. Project was renamed as AICRP on Honey bees and Pollinators with mandate of sustainable use pollinator resources for sustainable increase in the crop production. Many species of stingless bees, bumble bees, carpenter bees were documented from different parts of the country. Efforts have been made for domiciliation of the Non-apis bees for utilizing their pollination services. Basic studies on the nest architecture provided scientific basis for designing the artificial nesting structures. Novel techniques and methods were evaluated for the management of pests and diseases of bees. Mellisopalynological studies were carried out as supplementary evidence for seasonal major floral preferences of bees. Pollen supplements and pollen substitutes were formulated and evaluated for their acceptance and performance during the dearth periods.

Technical programme of the project during 2010-2015 was majorly emphasized on the impact of habitat on the pollinator diversity in major crops. Established model pollinator gardens for in situ conservation of pollinator species. Nesting preferences of

*Apis florea* and *Apis dorsata* were studied for making efforts for their conservation. Pollen dispenser, a novel technology was developed and popularized for efficient pollination of apple orchards with low pollenizer proportions. Community based approach for managed pollination in apple orchards at Kinnaur districts was great success. Project provided consultancy for Madhu Sandesh, a CSR programme by Crop Life India and KVK, Baramati for

responsible use of pesticides and managed bee pollination in pomegranate and onion seed crop. This programme has received international accolades for innovative communication mode for sustainable agriculture production. Tribal sub plan training programmes of the project have raised the hopes of hundreds of tribal families through promotion of scientific bee keeping as a sustainable livelihood option.

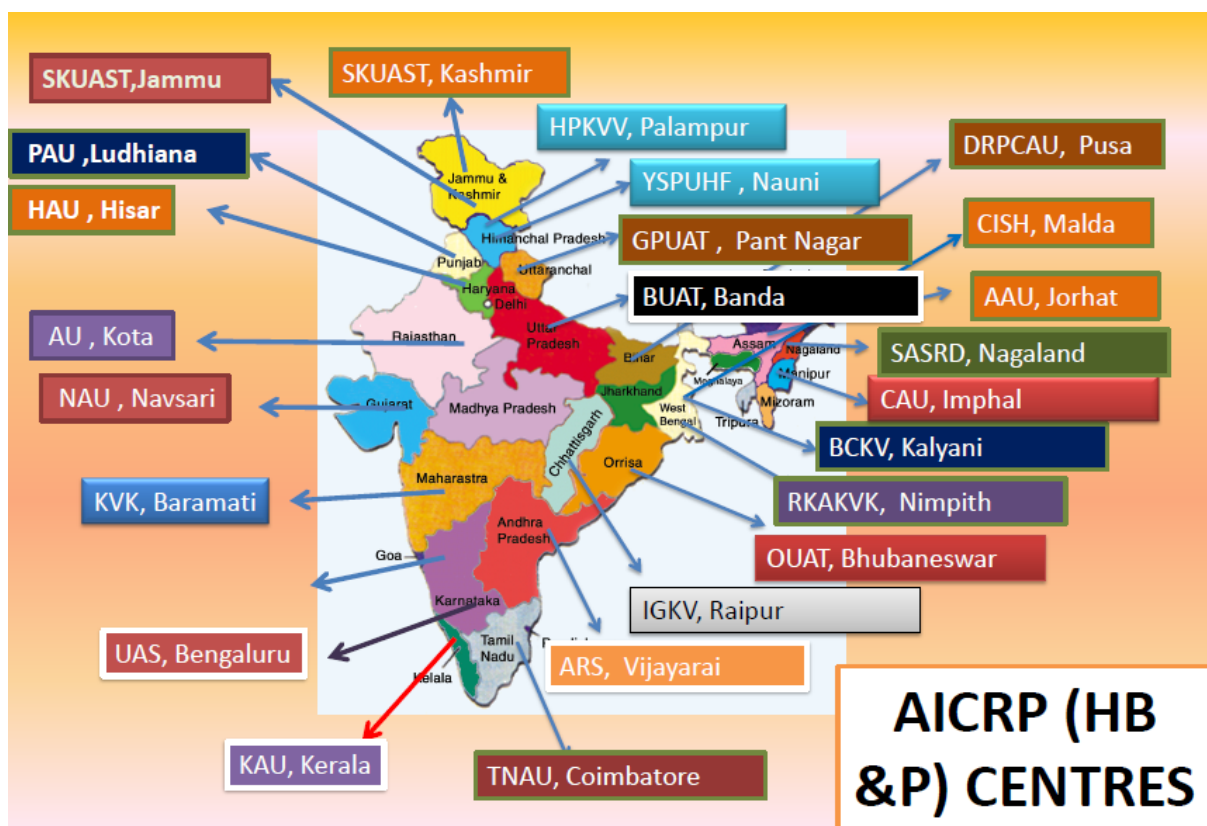


Fig. 1. Location of AICRP centers in India

The main focus of the project during 2015-2020 is on selection and multiplication of high yielding and disease resistant stocks through natural and artificial mating methods. Efforts are being made for mass multiplication of indigenous bumble bees under laboratory and their utilization in pollination of crops under protected cultivation. Similarly, stingless bees and *Xylocopa* will be evaluated for their

pollination efficiency under protected cultivation. Pest and disease management employing non-chemical methods will be priority to reduce the contamination of bee products with chemical residues. Designing of new hives and evaluating in different climatic zones for colony productivity and performance. Ecological impact of insecticides and GM crops on foraging behavior of bees is being studied. Climate

change simulation studies to foresee the impact of elevated temperature and carbon dioxide on the foraging efficiency and floral

rewards and its impact on crop production are on the way.

Table 1. Important achievements in AICRP on Honey Bees and Pollinators

Sl No.	Year	Technology Developed/Standardized
1.	1988	Selective breeding of <i>Apis mellifera</i> and <i>Apis cerana</i> for Honey production
2.	1989	Pollen substitutes for <i>Apis mellifera</i>
3.	1994	Standardization of Royal jelly Production
4.	1995	Modified Woodframe cell locater
5.	1995	Introduction of <i>Apis mellifera</i> to Orissa, Assam and Kerala
5.	1996	Developed bee keeping calendars for the state of Himachal Pradesh, Assam, Bihar, Haryana and Orissa
6.	1996	Introduced of <i>Apis mellifera</i> to Karnataka, Andra Pradesh
7.	1996	Selective breeding of <i>Apis cerana</i> for Thai sac brood virus resistance
8.	2001	Standardized propolis collection method
9.	2002	Standardized technology for maintaining queen bee reservoirs
10.	2002	Standardized techniques for large scale production of Royal Jelly, Propolis and Bee venom
11	2002	Designed modified hoarding cages for toxicity studies
12.	2003	Developed ELISA Kit for detection of sac brood virus in <i>Apis mellifera</i> and Thai sac brood in <i>Apis cerana</i>
13	2003	Standardized technology for isolation of EFB pathogen
14.	2003	Characterized local isolate of <i>Mellisococcus plutonis</i>
15.	2003	Developed technology for enhanced drone brood rearing for breeding
16.	2004	Standardized technique for mass queen rearing in <i>Apis mellifera</i>
17.	2004	Developed bee package technology for establishing colonies at a new site
18.	2005	Developed domiciliation techniques for bumble bees and <i>Xylocopa</i> bees
19.	2005	Designed and tested mating nuclei (baby nucs) for maintaining the queen bee reserves
20.	2006	A simple and efficient pollen trap made up of Kail wood was designed and evaluated
21.	2007	Developed royal jelly extractor
22.	2008	Developed technology for delaying granulation in Brassica honey
23.	2009	Standardized cup kit method for mass queen rearing in <i>Apis mellifera</i>
24.	2011	Developed technology for management of absconding in <i>Apis cerana</i>
25.	2012	Developed light weight pollen dispensers/inserts for pollination of apple crops
26	2012	Documented diversity and biology of stingless bee species
27	2012	Developed Database on mellisopalynology of major bee source plants of Pantnagar
28	2012	Developed and evaluated greater wax moth traps

29	2013	Standardized carpenter bee rearing technique in wooden frames
30	2013	Isolation and characterization of <i>Nosema ceranae</i> infecting <i>Apis mellifera</i>
31	2014	Selective breeding of <i>Apis mellifera</i> colonies for Apple and Litchi pollen preference
32	2016	Selective breeding of <i>Apis mellifera</i> colonies through artificial insemination
33	2017	Standardized technology of mass queen rearing in <i>Apis cerana</i>
34	2018	Developed low cost domicile structures for nesting of solitary bees
35	2018	Developed value added products of honey

Since the inception of the project, one of the major emphases of the project was to spread the knowledge of scientific bee keeping across the country through basic and advanced training programmes. Landless labourers, rural youth and women were inspired to adopt bee keeping as their livelihood enterprise. Many of the trainees have become successful entrepreneurs by the constant guidance and support of the AICRP (HB&P) centers. Till today AICRP (HB&P) trains thousands of rural youth, women and farmers every year. Awareness programmes on pollinator's health and pollination management are organized to farmers and bee keepers for adaption of managed bee pollination for increasing the crop productivity. National Bee Board and Tribal Sub Plans have provided the necessary financial support for trainings. AICRP (HB&P) with its distinction of being only research network working on honey bees and pollinators after structural weakening of the Central Bee Research and Training Institute, Pune. The project from the beginning has provided yeomen services for the spread of scientific bee keeping and solving problems faced by the bee keepers through need based systematic research. However, research on honey bees and pollinators need to be scaled up further to meet the international standards to cater the anticipated challenges

effectively. Hon'ble Prime Minister aspiration of doubling the farmers Income and Sweet Revolution will be reality by promoting bee keeping backed by strong research network with better institutional and infrastructural support.

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