SUMMARY

Conserve Bees - Conserve Biodiversity
One of the prerequisites for the improvement of bee keeping industry with the native hive bee *Apis cerana indica* F. is the identification of the different natural subspecies /ecotypes of this native bee species in the region and their further genetic improvement by selection and breeding. Morphometric studies are important research tools, which are now being used extensively for identification of different subspecies/geographical ecotypes of different species of honeybees. These methods involve measurements and analysis of different morphological parts of honeybees that directly or indirectly influence the economic and biological characters such as honey production, wax secretion and pollination activities. Hence, investigations were undertaken in different locations viz., Megaravalli of Apiary – Agumbe, Theerthahalli; Bheemanakone of Apiary - Purappemane, Hosanagar; Hegdekoppa of Apiary - Agumbe, Theerthahalli; Halasinahalli of Apiary - Hosanagar, Hosanagar; Nittur of Apiary - Hosanagar, Hosanagar; of Shimoga district during different seasons with difference in altitude to know the variations in morphometric characters. Further, pollen carrying capacity, honey and pollen stores and bees’ population studies were undertaken in black and yellow strains of *Apis cerana indica* F. at Bheemanakone of Apiary - Purappemane, Hosanagar.

The variations in morphometric characters with change in altitude and different seasons are summarized as follows, the bees of higher altitude locations like Megaravalli and Bheemanakone (Black strain) were recorded longer tongue length (4.56 and 4.42 mm, respectively), longer forewing (7.89 and 7.84 mm,
respectively), more number of hamuli (16.15 and 15.85 number, respectively), larger abdomen sternites etc. However, bees from lower altitude areas like Nittur and Halasinahalli were noticed to have relatively shorter tongue length (4.06 and 4.16 mm, respectively), smaller forewing length (7.64 and 7.71 mm, respectively), less number of hamuli (15.10 and 15.25 number, respectively), and smaller abdomen sternites etc. Similarly, other associated characters of bee samples found influenced by different altitudes. However, slight variation was noticed in morphometric characters between the seasons.

Pollen carrying capacity, honey stores and pollen stores were recorded in both black strain and yellow strains at 15 days interval and bees population taken once in a month. The results of the present investigations are summarized below.

Pollen carrying capacity of both black and yellow strains was maximum in winter season. Bees carried heavier pollen load in second half of January (7.95 and 7.77 mg, respectively), which gradually decreased from January onwards. Both black and yellow strain bees brought heavier pollen pellets at 09.00 hr followed by 12.00 hr and least at 15.00 hr. Among both strains of honey bees black strain brought heavier pollen pellets throughout the year compared to yellow strain.

Pollen and honey stores in black strain and yellow strain were recorded throughout the year. However, during December, January and February both pollen and honey stores was at its peak. The maximum pollen and honey stores in both black and yellow strains were recorded during January (pollen 391 and 369
cm², respectively, honey store was 1045 and 984 cm², respectively). Both black and yellow strains stored higher amount of pollen and honey in winter season (pollen was 303 and 279 cm², respectively, honey was 857 and 810 cm², respectively) than summer (pollen was 116 and 102, honey was 429 and 405 cm², respectively) and rainy season (pollen was 132 and 117 cm², respectively, honey was 366 and 347 cm², respectively). Among the strains, the black strain recorded more pollen and honey stores compared to yellow strain. Bee population in both black and yellow strain colonies was more in January (11534 and 10993 bees, respectively) and decreased continuously till July (3981 and 3798 bees, respectively). However, from August (4121 and 3886 bees, respectively) onwards population gradually increased till January. During winter season in both black and yellow strain colonies bee population was more compared to summer and rainy seasons.

Among two strains, the black strain showed better performance in pollen carrying, honey store, pollen store and had comparatively higher population throughout the year compared to yellow strain. Hence the black colonies are better for breeding work.

Melissopalynology plays a very important role in Beekeeping Industry. It mainly deals with the study of pollen grains present in the honey samples and pollen loads collected by honeybees. The study is very essential to assess the beekeeping potentials of a place, to know the supplementary bee plants flowering in a locality and to compile a bee floral calendar
The results of the investigations carried out on bee flora of different study sites of Shimoga district, foraging behavior, and melissopalynological studies of *Apis cerana* Fab, are summarized here under.

Totally 139 plant species were found to yield pollen and/or nectar for *Apis cerana*. They constituted 27 field crops, 23 vegetable crops, 17 fruit and plantation crops, 21 ornamental plants, 25 including herbs, shrubs and bushes and 29 trees. Among these, 14 were major pollen yielders, 36 were medium and 69 were minor pollen yielders. Nectar yielding plants consisted of 39 major, 21 medium and 59 minor species. The floral calendar of Shimoga district shows the important bee plants and their flowering periods, which will help the beekeepers in better utilization of local flora for the development of beekeeping.

The foraging activities were positively correlated with maximum temperature and sunshine and negatively correlated with rainfall, relative humidity, wind speed and minimum temperature.

Palynological investigations made on 139 pollen loads of *Apis cerana* F. workers indicated that 73.61 per cent of pollen loads were unifloral and 26.39 per cent were multifloral pollen types. A pollen spectrum Shimoga district was prepared based on the study, which will be useful for identifying the honey plants in the locality. Pollen analysis from honey samples revealed that *Callistemon lanceolus*, *Cocos nucifera*, *Eucalyptus globosa*, *Azadirachta indica*, *Pongamia pinnata*, *Peltophorum* sp., *Brassica nigra*, *Antegonon leptopus* and *Mimosa pudica* are the dominant pollen types in Shimoga district.