ABSTRACT
A detailed investigation on the quality and quantity of bee flora, the rate of nectar and pollen flow from bee flora during different seasons of a year, the rate of collection of pollen and nectar by honey bees, the method of beekeeping and extent of application of modern bee management practices in the malnad area of Karnataka covering an area of 17,747 Sq. km. was carried during 1992-1996.

The malnad region of Karnataka has varied and diversified bee flora. The bee flora identified in the study area consist of 415 species. The occurrence of 415 bee flower species indicates that the study area is rich in bee flora and contained many valuable bee flower species. The availability of diversified flora greatly support beekeeping throughout the year.

Further, the bee flora of the study area were classified according to the type of food rewarded to honey bees. The 415 bee flower species were grouped into three categories, nectar bee flora, pollen bee flora and pollen and nectar bee flora.

The bee flora yielding only nectar were identified and classified. The number of bee flora that yielded only nectar were 52. Of the 52 nectar bee flora, 8, 36 and 8 respectively were major ($N^1$), medium ($N^2$) and minor ($N^3$) plants. Of these, 22 were common (C), 28 rare (R) and 2 very common (VC) nectar plants. Comparatively, the nectar bee flora were less in number than the pollen bee flora and those yielding both pollen and nectar.
The pollen bee flora numbering 108 were identified and consisted 4 very common (VC), 59 common (C) and 45 rare (R) pollen plants respectively. Of these 20 were major (P<sup>1</sup>), 53 were medium (P<sup>2</sup>) and 37 minor (P<sup>3</sup>) bee plants.

The bee flora yielding both pollen and nectar was 255. Of these 17 were major (P<sup>1</sup>N<sup>1</sup>), 143 common (C), 14 very common (VC) and 98 rare (R). Bee flower species yielding both pollen and nectar were more in number than those providing either pollen only or nectar only.

The area rich in pollen and nectar bee flora increase the rate of flow of pollen and nectar into the colony considerably and thus the honey production of the area also increases substantially.

The bee flora of the study area were further classified on the basis of economic importance, vegetation, honey seasons and plant families.

The bee flora were grouped into 13 types based on the economic importance. The medicinal bee flora comprises 24.19 % followed by 19.23%, 12.98% and 10.10% of ornamental, timber and fruit bee flower species respectively. Rest of the 9 types account for less than 10% respectively. The bee flower species of the study area consists of largely trees and their number 201 were higher than shrubs (124) and herbs (90).
The bee flora consist of 121 annuals and 294 perennial plant species. The identified bee flower plants consist of 82 (20.00%) and 333 (80.05%) agricultural and non-agricultural plant species respectively. The number of bee flora found blooming during summer honey season (186) was comparatively more than those blooming both in winter (120) and all seasons (35).

Bee plant species belong to 98 plant families were identified in study area. The major bee plant family was Fabaceae (6.25%). Thus the availability of many diversified bee flora greatly support beekeeping throughout the year.

The floral calendar of 415 bee flower species was determined. The blooming of bee flora was observed throughout the year and the maximum bee flower species (189) blooming during March was observed. The blooming of maximum number of nectar bee plants was observed during March. The blooming of bee flora yielding only pollen was observed throughout the year and their number during February (50), March (58) and April (51) was comparatively higher than other months of the year. The blooming of bee plants yielding both pollen and nectar was relatively higher in number than those providing either only pollen or nectar. A maximum of 109 bee flower species yielding both pollen and nectar was in bloom during March. The blooming of different bee plants throughout the year help to find out ways of overcoming the dearth periods and also increases the honey yield substantially.
The total nectar sugar concentration of nectar of 307 bee plants was determined. The mean nectar-sugar concentration varied between 17.9% and 62.6%. The nectar sugar concentration of most of bee flora varied between 31% and 60%. The nectar sugar concentration of bee flora in the study area is within the favourable range.

The major and popular pollen and nectar plants namely *Anacardium occidentale*, *Azadirachta indica*, *Brassia juncea*, *Coriandrum sativum*, *Helianthus annuus*, *Mangifera indica*, *Musa paradisica*, *Phaseolus radiatus*, *Tamarindus indica* and *Tectona grandis* were selected for detailed study of nectar secretion, bee visitation and flow of nectar and pollen.

The secretion of nectar in all 10 test bee plants was observed throughout the day and the production of maximum quantity of nectar was noticed during the morning hours of the day. The volume of nectar yielding in 10 bee plants varied between 0.2 ul and 1.56 ul.

The honey bees visited 10 test bee plants continuously from 06.00 hours to 18.00 hours and the maximum rate of bee visitation was observed during morning hours of the day. The number of bees visiting test bee plants varied between 8 and 108 bees respectively.

The size of nectar load of worker bees collecting nectar from 10 test bee plants showed considerable variation in relation to time of the day. The mean size of nectar load varied from 5 ul to 45 ul.
The size of pollen load of bees collecting pollen from 10 test bee plants showed variation in relation to different hours of the day. The size of pollen load varied from 4.2 ug to 14.20 ug. All the 10 test bee plants provided substantial quantity of pollen and nectar to honey bees and are found to be of great importance to beekeeping in the study area.

The total forest area of Shimoga and Chikmagalur study centers was 212344 and 187465 hectares respectively. The total forest area of Shimoga study centre was comparatively higher than Chikmagalur study centre.

The agricultural crops of beekeeping importance were Paddy, Maize, Ragi, Pulses, Groundnut, Sunflower and Soya bean. Their area of cultivation in the two study centres as well as in the entire state was determined. Of the agricultural crops Paddy and Ragi were predominant and cultivated in larger areas.

The area of cultivation of horticultural, plantation and spice crops of beekeeping importance was determined in the study area. Areaca catechu and Cocos nucifera were widely cultivated.

Commercial flowers crops of beekeeping importance namely Chrysanthumum indicum and Jasmine Spp. were widely cultivated in both the study centres.
The forest flora, agricultural, horticultural and plantation crops are cultivated in vast area and there density is also very high. As a result the honey production in area rich in forest, agriculture and horticulture is greater than other areas.

The honey production in Shimoga study centre was comparatively higher than Chikmagalur study centre. The honey production declined during 1992 to 1996 in Chikmagalur study centre.

The number of beekeepers in the study area in 1992 to 1996 varied between 2663 and 3896 and the corresponding number of bee colonies was 6018 and 6825. The number of bee colonies decreased in both the study centres from 1992 to 1996. The results clearly suggested the complete absence of commercial beekeeping in the study area. Further, beekeeping with less number of colonies is uneconomical and expensive.

The results of the study clearly indicate the presence of valuable diversified bee flora supporting beekeeping throughout the year. Results also indicate that the malnad region is one the best beekeeping area of Karnataka provided scientific methods of beekeeping are adopted.