7. Conclusion

7.1. Agriculture ecosystems of Chamarajanagar District have hosted 115 species of butterflies, which include 13 protected species and two endemic species.

7.2. The protected and endemic species occurrence at agriculture ecosystems has indicated the need to undertake conservation measure to protect these species.

7.3. Rainy season has scored more butterfly species compared to other seasons. Perhaps it is due to favorable environmental conditions for the normal growth and development during the life cycle of butterfly species.

7.4. The relative humidity and rainfall influencing the seasonal diversity and distribution of butterfly species.

7.5. The butterfly migration was bi-directional and annually, which was influenced by monsoon.

7.6. During the present study, Shannon Wiener (H^1) (Alpha Diversity) Index showed higher values during winter and rainy seasons compared to summer season. Equitability (J) showed smaller variation that clearly indicated the uniform distribution of butterfly species at all the taluks during different seasons. The Sorenson’s values between the taluks suggested the even distribution of butterfly species at all the taluks of Chamarajanagar District.

7.7. To complete the life cycle, butterfly species namely Papilio polytes, Graphium agamemnon, Ariadne merione and Junonia hierta required different durations. The plants for oviposition, nectar plants of adult butterflies and selection of flower colour by butterfly species shown specificity.

7.8 The ovipositing behavior of these butterfly species showed positive correlation with annual rainfall and relative humidity, but negative correlation was recorded with temperature. Thus, environmental conditions viz., relative humidity and annual rainfall have influenced the egg lying behavior of butterfly species.
7.9. Floral calendar provides a ready rockner about available flora for butterfly species during different seasons. It is one the important tool to know the butterfly diversity at different agriculture ecosystems. Thus, attempts have been made to prepare floral calendar for butterfly species at this part of the State.

7.10. Non-cultivable lands are considered to be one of the more preferred natural breeding grounds for many butterfly species. They provided suitable site for oviposition with minimum human interference due to less disturbance and availability of good forage.

7.11. The pesticides namely organochlorine (e.g. Hexazinone, Ethofenoprox, Imidacloroprid and Azadirachtin), organophosphorus (e.g. Qunalphos, Butachlor, Pretilachlor, Ediphenphos, Chlorpyrifor and Endosulfan), pyrethroids (e.g. Deltamethrin, Dimethoate, Dichlorvos, Dlnotefuran, Thiamethoxam, Cypermethrin) and other pesticides (e.g. Copper oxy chloride, Copper hydroxide, Dichlorvos. Zineb and Hexaconazole) were sprayed on various crops grown at different cropping areas. This has decreased the density and diversity of butterfly species. The Spialia galba, Suastus gremius, Telicota ancilla, Edales pandava, Prosotas nora, Zizeeria Otis, Zizula gaika, Melanitis leda, Ypthima asterope, Eurema blanda, Eurema brigitta and Leptosia nina which belong to Hesperiidae, Lycaenidae, Nymphalidae and Pieridae families become victims to the pesticide poisoning.

7.12. The density and abundance of these butterfly species showed considerable variation between before and after pesticides spray at different cropping areas.

7.13. Vehicular traffic could limit the dispersal of butterflies across different road ways enroute their migratory path. It encouraged the death of migrant and non-migrant butterfly species. The National and State highways passing amidst agriculture ecosystems developed a ‘Barrier effect’ and claimed 1,667 native butterflies which belong to 41 species in four families. Around 12,550 individuals belong to two to three species (e.g. Euploea core, E. sylvster, Tirumala limnace and T. septentrionis) of migrating butterflies have died in road kills. The males
died more at all the road types during their migration. Further, butterfly species death at different road types increased due to increased vehicular traffic.

7.14. *Telenomus* sp. *Brachymeria jambolana* and *Pteromalus puparum* were recorded as the parasitoids, infected the egg, larva and pupa of *Papilio polymnestor*, *Graphium agamemnon*, *Euploea core*, *Papilio polytes*, *Pachiliopta aristolochiae* and *Danaus chrysippus*. Moreover, different species (e.g. *Argiope*, *Hippasa*, *Rhene*, *Selenopes* and *Zygeilla* species) of spiders were acted as natural enemies attacked few butterfly species at different cropping areas. These natural enemies could be used as ‘biological control agents’ for the control of different butterfly species which act as pests. However, further in depth studies are required to understand about their predation on butterfly species.