

A database for the melliferous flora in the Nilgiri Biosphere Reserve, India

Shiny Mariam Rehel
Botanist
Keystone Foundation

Introduction

The Nilgiri Biosphere Reserve lies at the tri-junction of the three southern states of Tamil Nadu, Karnataka and Kerala. Being a veritable store house of natural wealth, the reserve is unique in many aspects. Not only is it located at the meeting point of the Western and the Eastern Ghats but it also harbors unique floral and faunal wealth. Within an area of about 5670 sq. km, there occur more than five forest types and as many as six protected areas. It includes amongst its brace the sanctuary complex of Wynad, Nagarhole, Bandipur, Mudumalai, Mukurthi, and the entire forested slopes of Nilambur, the Upper Nilgiri Plateau, the Silent valley and the Siruvani Hills. The total area of the biosphere reserve is around 5670 sq.km. of which 2020 sq. km is the core zone, 2290 sq. km. is the manipulation zone (forestry), 1330 sq. km. as manipulation zone (agriculture) and 30 sq.km as restoration zone. The region also includes the largest known population of two endangered animals namely the Lion Tailed Macaque and the Nilgiri Tahr and also a wide diversity of faunal wealth. Such diversity in so small an area makes it the heaven for biological researchers and wildlife enthusiasts.

The Nilgiri Biosphere Reserve completely encircles the massive Nilgiri Plateau and extends over wide and diverse ecological, geological, cultural, climatic and geographic zonations. Due to the enormous differences, there has grown unique indigenous forest types and numerous endemic species. The Reserve includes within its area parts of two of the twelve biogeographic zones (The Malabar rainforest and Deccan Thorn forest) and as a result encompasses within it a wide spectrum of spectacular species and ecosystems.

The Nilgiris Reserve includes all the important forest types that are to be found in South India as well as some that are just peculiar to the belt such as Tropical Thorn Forest, Tropical Dry Deciduous Forests, Tropical Moist Deciduous forests, Tropical Semi Evergreen forests, Sub Tropical Broad Leaved Forests, Tropical Wet Evergreen Forests, Southern Montane Wet Temperate Forests, Southern Montane Wet Grasslands and Subtropical Hill Savannas.

While pollen studies have been done with regard to studying change in vegetation patterns, no conclusive and detailed study has been done on melliferous flora and role of bee pollination in the NBR. During the course of the work with bees that has been already done in the area by a wide range of people, from indigenous people to field personnel, a lot of indigenous and firsthand information has been amassed. This project attempts to provide a scientific basis to this information and explore new avenues that can be developed through further research.

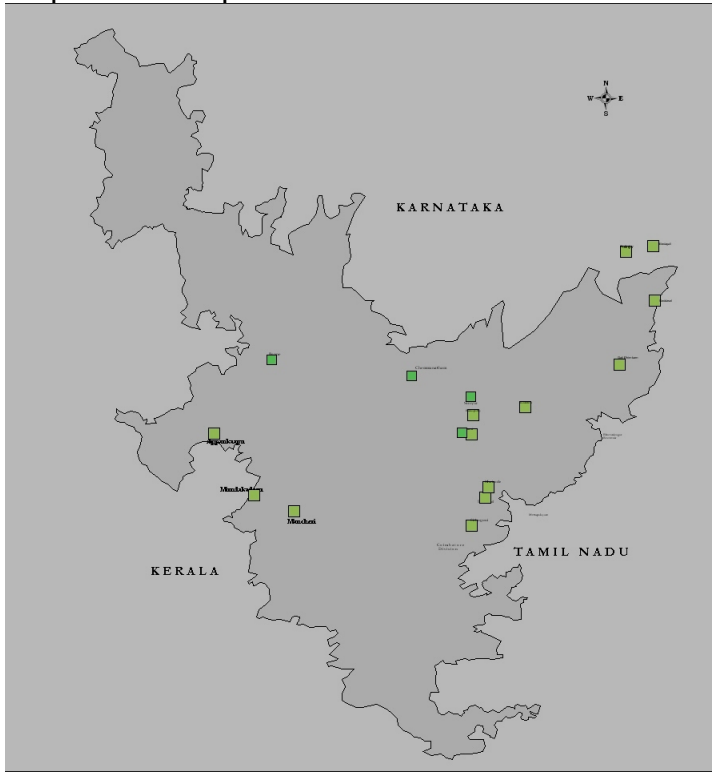
Objectives of the study:

To prepare a catalogue and database of melliferous flora at 5 sites created.
To study pollination requirement of some local crops and non-timber forest products.

Study site

Site	Plot	Attitude	Plot-Vegetation	Site-vegetation	Community
Nilambur	Appankappu	198m	MDF	SEG	Kattunaickan
	Mundakadavu	96m	DDF	MDF	Padinaickens
	Mancheri	258m	MDF	MDF	Cholanaickens,
Coonoor	Pudukadu	890m	SEG	MDF	Kurumbas
	Marikode	1094m	SEG	DDF	Kurumbas
	Situgunni	582m	DDF	DDF	Irulas
Sigur/Mudumalai	Bennae	936m	MDF	MDF	Kattunaickan
	Semmanatham	877m	DDF	DDF	Kasava
	Siriyur	875m	DDF/Riparian	DDF	Kasava
Kotagiri	Bikkapathymund	1831m	EV	Shola	Todas
	Kodithenmund	1665m	EV	Shola	Todas
	Thuneri		Agriculture	Agriculture	Bdg, locals
Dhimbam/Chamrajnagar	Geddasal	1250m	SEG	MDF	Sholigas
	Galithiambam	1256m	SEG	MDF	Irulas
	Bedaguli	1304m	SEG with elements of deciduous	DDF	Sholigas
	Kurimandai	1013m	DDF	DDF	

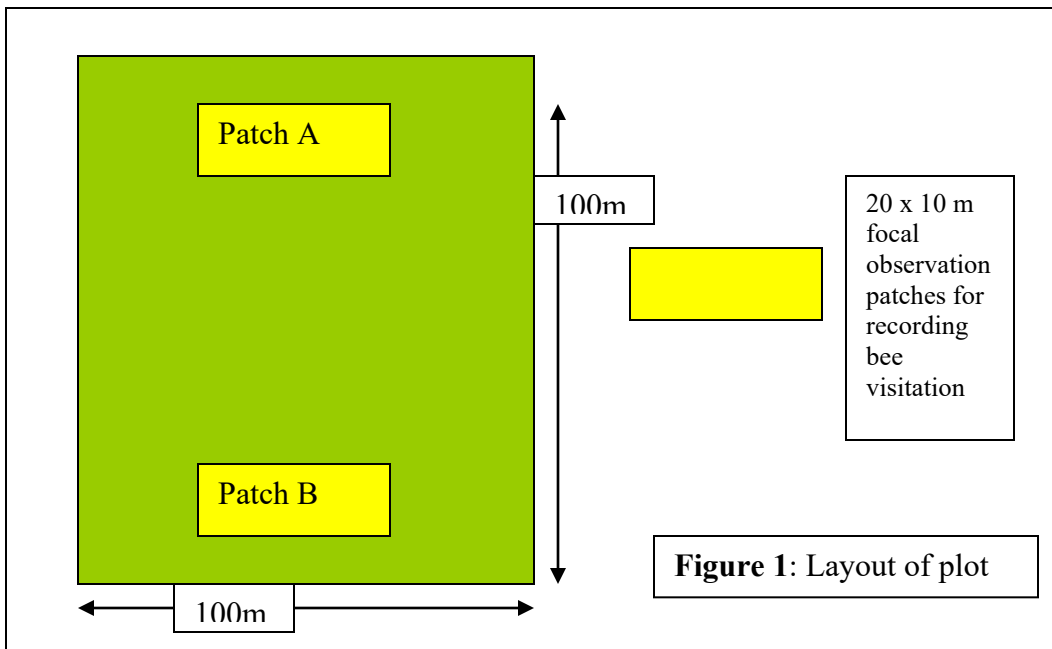
Map 1: Site map



Methodology

The bee flora can be identified by observing honeybees foraging on flowering plants.

Observation:



In each of the study sites selected a 1 hectare plot is marked. In the 1 hectare plot two focal patches (A and B) of 20 m x 10 m are marked. All through out the study the observations are made in these two focal patches A and B. Data is collected by observation once a month. During observation the researcher moves freely through the marked area for 30 minutes siting bees foraging on flowering species and recording the species of both the bee and the flora on a datasheet. The number of visits made by each bee species on the flowering species during 5 minutes is recorded. The observer does not spend more than 5 minutes at any single plant or flowering patch. The day of observation is divided into three 30 minute surveys in each focal patch:

09:00 – 09:30 Patch A, survey 1

09:30 – 10:00 Patch B, survey 1

12:00 – 12:30 Patch A, survey 2

12:30 – 13:00 Patch B, survey 2

15:00 – 15:30 Patch A, survey 3

15:30 – 16:00 Patch B, survey 3

Recording phenology:

In each 1 hectare study plot, an inventory of plant species is made.

The dominant tree species in the 1 hectare plot is tagged and the phenology is recorded. For phenological recording for shrubs and herbs a 5 m x 5 m quadrant is laid randomly in the 1hectare and the phenology is noted. Phenological recording is done once every month.

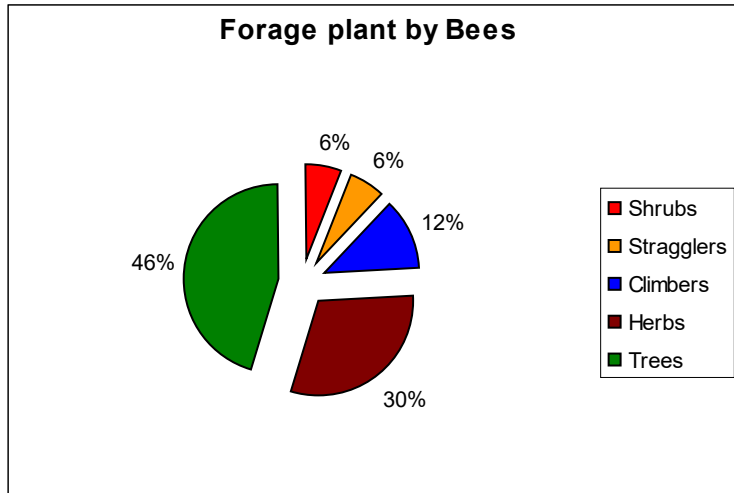
Pollen slides:

The pollen samples are collected from flowering plants that are foraged by bees as a source of food. The sample collection is also made from the bee load. The bees are captured by using the hand-net; the pollen load is removed from the bee and kept in separate vials so that pollen can be collected off their bodies. These storage containers are kept clean and labelled to prevent contamination from other pollen sources.

Results and discussion

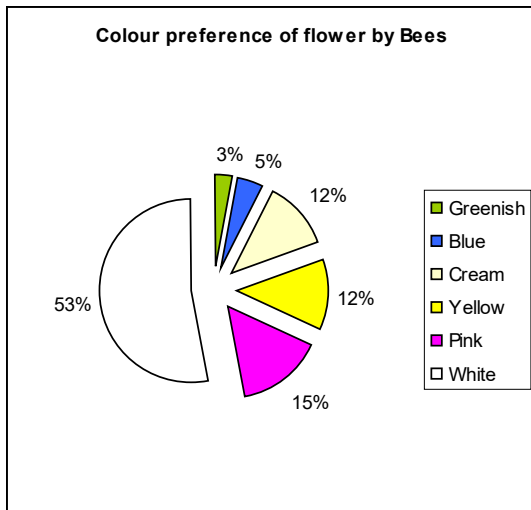
Phenological data that has been collected through the months of January to August has been collated. Data collection is an ongoing process and it will continue till the end of the year, 2007. From the foraging data collected, in the 16 plots, 66 plant species have been observed to be foraged by bees of *Apis* species and *Trigona* species. The bees have foraged flowers majorly on tree species and herbs (Chart 1). Occurrence of trees as major contributors of nectar and pollen for honey bees have been reported by several workers, (Jhansi and Ramanumam, 1886; Ramanujam and Khatija, 1991; Vijayalakshmi, 2005). The reason for higher proportion of trees as a source of bee food could be attributed to the availability in terms of quantity and also the trees provide an ideal canopy for safe foraging of honey bees.

Chart 1:



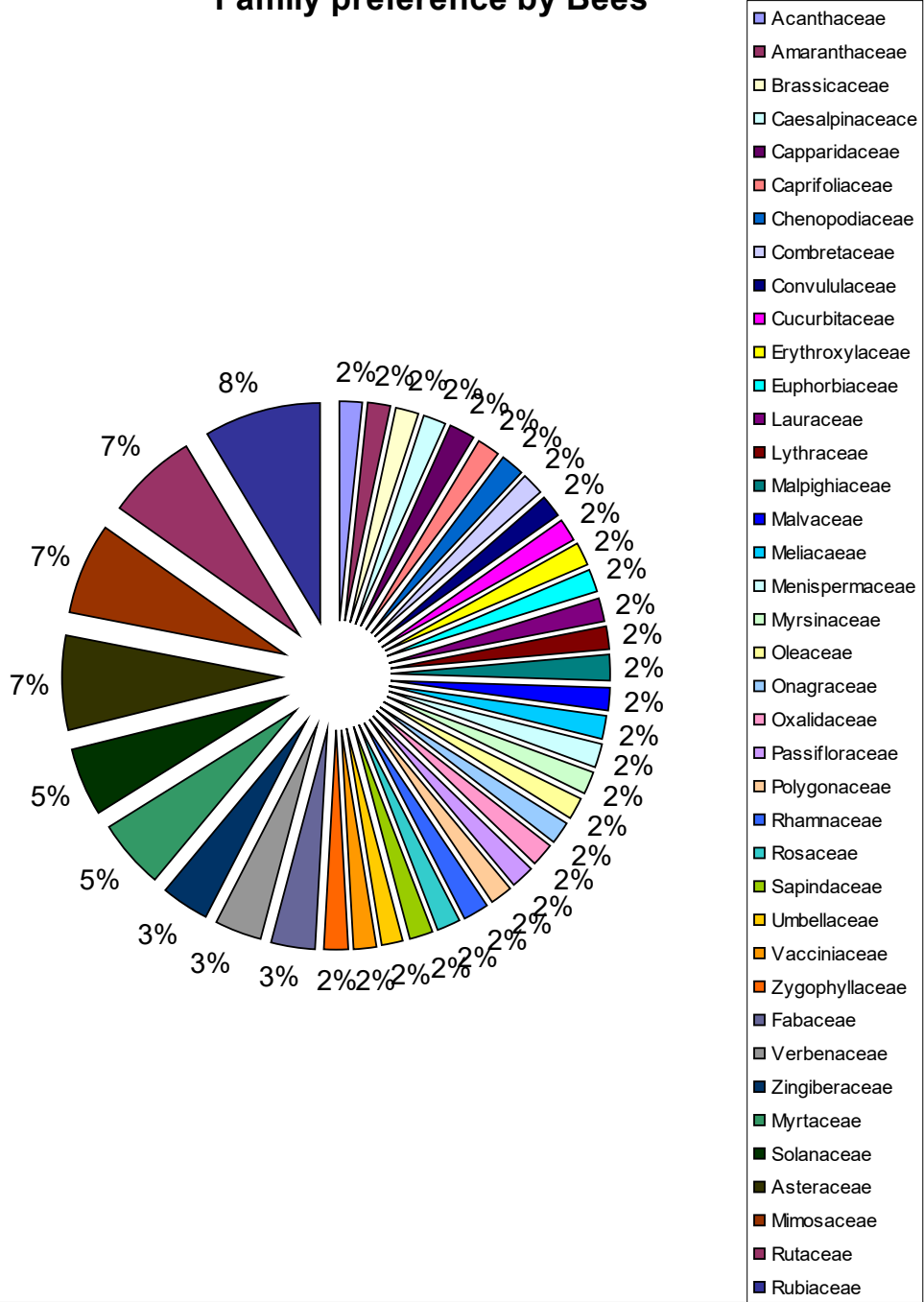
Bees in general have been reported to be associated with the flower species possessing blue or yellow color (Kevan, 1983; Scigin, 1983). The study shows that, bees have been found to forage white, pink, cream, yellow colored flowers (Chart 2). The study by Raju and Rao on the forage plants of *Apis cerana indica* at Vishkapatanam has shown that the bee forage on different colour, especially white, cream, yellow and purple and hence, is in partial agreement with the generalization.

Chart 2:



In both study areas families of plants belonging to Rubiaceae, Rutaceae, Mimosaceae, and Asteraceae were predominant (CHART 3). Kalpana and Ramanujam (1996) reported Mimosaceae as an important family in Krishna district of Andhra Pradesh. Ceasalpinaceae and Mimosaceae were the predominant families in Nagapattinam district of Tamil Nadu (Varadharajan, 2002).

Family preference by Bees



Conclusion

Pollen slides for 104 plant species have been made and stored in the laboratory. This is envisaged to be developed into a permanent cross reference pollen library.

In the next year pollination studies in both natural forest and crops are intended to be conducted. Pollination studies will be carried out in natural forests, on trees that are a source of minor forest produce and are linked with the livelihood of people. A similar study will be carried out in food crops to test the efficacy of pollination services provided by honey bees.

Reference:

Kalpana, T.P. and Ramanujam C.G.K. 1996. Pollen sources for apiaries during honey flow period Krishna district, Andhra Pradesh, *geophytology* 25:125-129.

Vijayalakshmi 2005. Studies on the Bee Pasturage and Foraging Activity pattern Of The Indian Honey Bee *Apis cerana indica* in Sirur(Nilgiri dt.) and Kilpillur (Coimbatore Dt.)

Kalpana, T.P. and Ramanujam, C.G. k. 1991. A melittopalynological investigation of honey from *Apis florea* and *Apis dorsata* hives. *Biovigyanam* 17(1): 12-23.

Simon G. Potts, Stuart Roberts, Shiny Mariam Rehel, Anita Varghese and Raju Eswaran 2006. Bee Biodiversity Assessment: Manual of Field Methods Indian Bee Journal Vol. 59(I), 1997.