

Bee Flora (Richness) of Kalaburgi Region

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Abstract - The present investigation entitled study of “Bee flora of Kalaburgi region ” was carried out on the honey bees were recorded on different agricultural and horticultural crops during the season October 2018 to September 2019. It was observed that the Bee flora of Kalaburgi region consists of mostly fruits, vegetables crops ,plantations, medicinal and Aromatic, ornamental plants .It was revealed that they are 230 plants species as nectar and pollen yielding bee flora of honey bees .They constituted 16 vegetables crops, 12 field crops, 15 fruits, 6 Plantations ,49 ornamental plants, 2 herbs, 8 oilseeds, 78 trees, weeds 109, medicinal and aromatic plants 45, pulses 2 .Here the table 1 consists of bee flora of kalaburgi region and further it was divided into family wise distribution of bee flora and then it follows by floral calendar with bandings and the final table is with percentage abundance of bee flora which shows the highest number of bee flora in the month of November with maximum 59.13% on the basis of information of flowering period ,circular bee flora calendar was developed which can be used as a ready reckoner for the farmers. It revealed the presence of some of the plants which acted as a food source of honey throughout the year.

Key Words: Honey bees, Bee flora, family wise distribution, floral calendar and percentage abundance.

1.INTRODUCTION

Honey bees are the marvelous insects known to mankind since to pre historic times. Perhaps the bees are the only insects which are more beneficial mankind as they produce honey, wax, and venom and also involved in increasing crop production through pollination. Honey bees are popularly known as “Angels of agriculture ”, since they are the instrumental in increasing the productivity of crops nectar and pollen .The exclusive source of nutrition to the honey bees constitutes the raw materials to the bee keeping industry. Honey bees are the most important and superior pollinator of the natural ecosystem, as they store pollen and nectar for the future purposes to fulfill their requirement .Honey bees pollinates wide variety of flowers in mutuality or right from cultivated to wild species and ornamental crops. Scientifically, honey bees comprise mainly 4

species namely Apis- Dorsata, Apis-florae, Apis-cerena and Apis- mellifera. In the area under the investigation of kalaburgi region only 3 species are found that are Apis -florae , Apis- dorsata and Apis –cerena but Apis- Cerena are reared one in the agriculture university of Kalaburgi region. Including the non Apis species also found in the present study some of them are tetragonal irridipenis ,carpenter bee, xylocopa ,blue banded bee, leaf cutter bee these, were identified by our experts of agriculture department of kalaburgi region. These apis and non-apis species commonly known as honey bees as collect the nectar and pollen. Nectar which is a sweet liquid, carbohydrate rich source of energy from floral and extra floral nectar rise present in flower and leaves, which is the raw material for honey and pollen as a protein source. That's why farmers should have some idea about the availability of food in the natural form .The plants that yield nectar and pollen are collectively referred as bee flora for the promotion of bee keeping to be done in kalaburgi region. It is compulsory to study the bee flora, as we can 't harvest these species due to their ferocious nature that is Apis –Dorsata and Apis- Florae , but Cerena is reared in kalaburgi region , this proper study of bee flora in some ready reckoner forms and helps the farmers for the growth of flora .

Development of the family wise distribution bee floral calendar on the basis of availability of bee flora blooming period is the basic tool for the farmers of a particular area, which work as a decision in making tool for them as according to the availability of flora they can decide if the supply of pollen substitute or nectar supplement and the migration of the species will be not required .we surveyed the area, enlisted the bee flora and categorized them on the basis of availability over the months. Circular bee calendar was prepared and family categorization was also done and made a ready reckoner for the farmers with percentage abundance of the bee flora of kalaburgi region ,which includes approximate duration of the blooming period of existing honey and pollen sources in an area . As we need good food sources and water facility for both Apis and non- apis species for our survival as honey bees and flowering plants have evolved together over Millions of years . Without

flowers, we would have no bees and without bees we could not have flowers as they are inter-dependent.

2. Methods and Materials :

2.1 Study Area

The present study was conducted during the month of October 2018 to September 2019 at kalaburagi region of north Karnataka. India as kalaburagi region is a semi- arid region .The observations were made during 3 consecutive seasons winter, summer and rainy seasons .The study of bee flora was done for one year. Kalaburagi district has a precambium system of non –fossiliferous sandstones, lime stones and shale's extending along the central part of the district. Kalaburagi is one of the north eastern districts of Karnataka lies between 76° 04 and 77° 04 longitude and 17° 46 and 18° 12 latitude The total area of the district is 16242 .4Sq km . This is the second largest district in Karnataka state .The district is situated within the Deccan plateau at an elevation of 445m MSL. The Plateau has a few outcrop with a mean elevation of 445 MSL. The deep black soil is rich in clay with a moisture of sandy loam is in kalaburagi . The soil pH is neutral (7-7.5) the soil is made up of 10% coarse sand ,20% of fine sand 70% clay and silt .The mean minimum varies from 7°c to 24° c and mean maximum of 24° c to 42° c may is the hottest month and the maximum temperature is recorded as 47° c and December – January, are the coldest months and minimum temperature was recorded 15° c . The dry months spread for period of seven months in a year .The overall rain fall of kalaburagi varies from all other districts of Karnataka. Here the mark increase in the rainfall and number of rainy day from November –April .This was considered as a good rainfall in the year 2019 June –august .



Fig -1: Map showing the study sites in geographically distinct areas in Northern Karnataka Kalaburagi

2.2. Methodology:

Each study visits served as pseudo replicates for the site and all observations were between the morning hours 8:30 -5:45 to evening hours in the three consecutive seasons winter ,summer and rainy. Honeybee foraging plants were determined with visit of honey bee workers on its flowers for 5-10 minutes. The observations on nectar and pollen source was based on the activities performed by honey bees on different flowers , I. e. honey bees with their activity of extending their proboscis into the flowers were considered as nectar source and bees carrying pollen on their hind legs were determined as pollen source of plants (Mbah and Amao, 2004; Bista and Shivakoti, 2000-2001) and those unknown plants were identified with the experts from agriculture college of kalaburagi , botany department of kalaburagi. Plants were categorized either rich in pollen (p1, p2) or in nectar (N1 ,N2) or combination of two indifferent levels (partap 1997).

TABLE 1: BEE FLORA OF KALABURGI REGION

SL.NO	COMMON NAME	SCIENTIFIC NAME	FAMILY	FLOWERING PERIOD	ECONOMIC IMPORTANCE	SOURCE AND ABUNDANCE
1	Adusoge	<i>Adhatoda zeylanica</i>	Acanthaceae	Sept-Nov	Weeds	N ₁ P ₂
2	Adavi chogache	<i>Andrographis paniculata</i>	Acanthaceae	Aug - Dec	Trees	N ₁ p ₂

3	Adumuthadu bali	<i>Barleria prionitis</i>	Acanthaceae	Sept - Oct	Ornamental	N ₂ P ₂
4	Agnishika	<i>Hygrophila auriculata</i>	Acanthaceae	Jan-Feb	Weeds	N ₂ P ₁
5	Akash balli	<i>Indoneesiella echiodides</i>	Acanthaceae	Sept - Oct	Medicinal & Aromatic	N ₂ P ₂
6	Akasha Mallige	<i>justicia diffusa</i>	Acanthaceae	Sept - Dec	Trees	N ₂ P ₂
7	Alale kayi mara	<i>J. Procumbens</i>	Acanthaceae	Dec-Jan	Trees	N ₃ p ₂
8	Ankali gida	<i>Lepidagathis cristata</i>	Acanthaceae	July-Nov	Weeds	N ₁ P ₁
9	Antikamini	<i>Peristrophe paniculata</i>	Acanthaceae	Sept - Nov	Field	N ₂ P ₁
10	Antuvala	<i>Trianthema portuclacastrum</i>	Aizoaceae	July - Dec	Weeds	N ₂ P ₂
11	Ashwagandha	<i>Zeleya decandra</i>	Aizoaceae	Aug-Nov	Ornamental	N ₁ P ₁
12	Asoka	<i>Alangium salvifolium</i>	Alangiaceae	Sept-Dec	Medicinal & Aromatic	N ₁ P ₂
13	Ativisha	<i>Achyranthus aspera</i>	Amaranthaceae	Oct-Nov	Weeds	N ₂ P ₁
14	Bakula	<i>Aerva lanata</i>	Amaranthaceae	Aug-Dec	weeds	N ₁ p ₂
15	Bale gida	<i>Digera muricata</i>	Amaranthaceae	Aug-Nov	Weeds	N ₁ p ₂
16	Balevadukona soppu	<i>Gomphrena celosoides</i>	Amaranthaceae		ornamental	N ₁ P ₁
17	Bare hannina mara	<i>Gomphrena globosa</i>	Amaranthaceae		Ornamental	N ₂ P ₂
18	Basale soppu	<i>Magnifera indica</i>	Anacardiaceae	July-Sept	Fruit	N ₁ P ₁
19	Basavana pada	<i>Annona reticulate</i>	Annonaceae	Dec-Jan	Fruit	N ₂ P ₂
20	Batlibrush gida	<i>Annona squamosal</i>	Annonaceae	July-Aug	Fruit	N ₁ P ₁
21	Beetae	<i>Artabotrys hexapetalms</i>	Annonaceae	Dec-Aug	Ornamental	N ₂ P ₁
22	Bekkina hejje balli	<i>Polyathia longifolia</i>	Annonaceae	Jan-Mar	Trees	N ₂ P ₁
23	Belavala ,Belada gida	<i>Centella asiatica</i>	Apiaceae	June-Dec	Medicinal & Aromatic	N ₂ P ₂

24	Bellary jali ,sarkari jail	<i>Coriandrum sativum</i>	Apiaceae	Jan-Dec	Vegetable	N ₃ p ₂
25	Benki tuttori	<i>Catharanthus pusillius</i>	Apocynaceae	Sept-Jan	Weeds	N ₁ p ₂
26	Bettada nelli	<i>Plumeria Rubra</i>	Apocynaceae	Dec-Mar	Ornamental	N ₂ P ₁
27	Bevina mara	<i>Rauwolfia Canescens</i>	Apocynaceae	Dec-Mar	Medicinal & Aromatic	N ₂ P ₁
28	Bhootale	<i>Thevetia nerifolia</i>	Apocynaceae	Nov-Feb	Ornamental	N ₂ P ₁
29	Bile gulmohr	<i>Wrightia tinctoria</i>	Apocynaceae	Sept-Dec	Medicinal & Aromatic	N ₁ p ₂
30	Bili yekkada gida	<i>cocos nucifera</i>	Aracaceae	Jan-Dec	Plantation	N ₂ P ₂
31	Bilihindi soppu	<i>Phoenix Sylvestris</i>	Aracaceae	Jan-Dec	Plantation	N ₂ P ₂
32	Bilishirasimara	<i>Calotropis gigantea</i>	Asclepiadaceae	Jan-Dec	Weeds	N ₂ P ₂
33	Bugari mara	<i>C.Procera</i>	Asclepiadaceae	Jan-Dec	Weeds	N ₂ P ₂
34	cabale ,samudra bale	<i>Cryptostegia grandiflora</i>	Asclepiadaceae	Dec-Mar	Trees	N ₂ P ₁
35	Cheebigida	<i>Tylophora indica</i>	Asclepiadaceae	Jan-April	Medicinal & Aromatic	N ₂ P ₁
36	Chigali Kara	<i>Acanthospermum hispidum</i>	Asteraceae	Nov-Dec	Weeds	N ₂ P ₂
37	Chitra moola	<i>Ageratum conyzoides</i>	Asteraceae	Nov-Feb	Weeds	N ₂ P ₁
38	Congress gida	<i>Cosmos Sulphureus</i>	Asteraceae	Aug-Oct	Ornamental	N ₁ p ₂
39	Cosmos	<i>Parthenium hysterophorus</i>	Asteraceae	Jan-Dec	Weeds	N ₂ P ₂
40	Dagadi balli	<i>Tricholepis radicans</i>	Asteraceae	Sept-Jan		N ₁ p ₂
41	Dalimbre	<i>Tridax procumbens</i>	Asteraceae	Jan-Dec	Weeds	N ₂ P ₂
42	Dasavala	<i>Veronica cinerea</i>	Asteraceae	Sept-Jan	Medicinal & Aromatic	N ₁ P ₁
43	Daturi gida	<i>Vicia Indica</i>	Asteraceae	Sept-Feb	Weeds	N ₁ P ₁
44	Devakanigale	<i>Xanthium strumarium</i>	Asteraceae	Sept-Feb	Weeds	N ₁ P ₁

45	Dhana	<i>Impatiens balsamina</i>	Balsaminaceae	Sept-Jan	Ornamental	N ₁ P ₂
46	Dhoopada Mara	<i>Dolichandrone falcata</i>	Bignoniaceae	Dec-Feb	Medicinal & Aromatic	N ₂ P ₂
47	Dodda Gonisoppu	<i>Kigelia pinnata</i>	Bignoniaceae	Dec-Feb	Trees	N ₂ P ₂
48	Duranti kanti	<i>Millingtonia hortensia</i>	Bignoniaceae	Jan-Mar	Ornamental	N ₂ P ₁
49	Edatiga	<i>Spathodea campanulata</i>	Bignoniaceae	Jan-April	Trees	N ₂ P ₁
50	Edurutrani	<i>Bixa orellana L</i>	Bixaceae		Trees	
51	Galimara ,Shirashimara	<i>Bombax ceiba L.</i>	Bombacaceae	Nov-Feb	Trees	N ₂ P ₁
52	Ghattavare	<i>cordenia procumbens L</i>	Boraginaceae	Jan-April	Medicinal & Aromatic	N ₂ P ₁
53	Goni soppu	<i>Brassica juncea</i>	Brassicaceae	Nov-Jan	Oil Seeds	N ₂ P ₂
54	Gorage pallye	<i>Boswellia serrate</i>	Burseraceae	Nov-Dec	Trees	
55	Govina mara	<i>Opuntia dillenii</i>	Cactaceae	Feb-April		N ₁ P ₁
56	Gubbachi bale	<i>Canna indica</i>	Cannaceae	Dec-Feb		N ₂ P ₂
57	Gubbi Savatikayi	<i>Capparis divaricate</i>	Capparidaceae	Dec-Feb		N ₂ P ₂
58	Gulangangi	<i>Polycarpon prostratum</i>	Caryophyllaceae	Nov-dec		N ₁ P ₁
59	Haladi Kanagile	<i>Casuarina equisetifolia</i>	Casuarinaceae	Nov-Dec	Ornamental	N ₂ P ₂
60	Hale,Neeli	<i>Maytenus senegalensis</i>	Celastraceae	Dec-Feb	Weeds	N ₂ P ₁
61	Havumekkekayyi	<i>Basella alba</i>	Chenopodiaceae	Jan-Feb	Vegetable	
62	Holebaise	<i>Chenopodium album</i>	Chenopodiaceae	Jan-Feb	Vegetable	N ₂ P ₂
63	Holematti	<i>Combretum Ovifolium</i>	Combretaceae	Oct-Nov	ornamental	N ₂ P ₂
64	Hongae mara	<i>Terminalla alata</i>	Combretaceae	Feb-Mar	Trees	N ₁ P ₁

65	Honnambre gida	<i>T. arjuna</i>	Combre taceae	Aug- Dec	Trees	N ₁ P ₁
66	Hucchu Nelabevu	<i>T. bellirica</i>	Combre taceae	Nov- Dec	Trees	N ₂ P ₁
67	Huligida	<i>T. chebula</i>	Combre taceae	Nov- Dec	Trees	N ₂ P ₁
68	Hunachikka	<i>T. crenulata</i>	Combre taceae		Trees	
69	Hunase	<i>Commelina benghalensis</i>	Comme linacea e	Oct- Jan	Weeds	N ₁ P ₁
70	Hunni gida	<i>Cyanoties fasciculate</i>	Comme linacea e	Sept- Oct		N ₁ P ₁
71	Ichala mara	<i>Rhoeo discolor</i>	Comme linacea e	Sept- March	Ornamental	N ₁ P ₁
72	Ippe mara	<i>Convolvulus stocksii</i>	Convol vulacea e		Medicinal & Aromatic	
73	Kachu	<i>Cuscuta refexa</i>	Convol vulacea e	Jan- Mar		N ₁ P ₁
74	Kadu haraka hullu	<i>Evolvulus alsinoides</i>	Convol vulacea e	Oct- Nov	Weeds	N ₁ P ₁
75	Kadu ragi hullu	<i>Ipomoea aquatic</i>	Convol vulacea e	Jan- Dec	Weeds	
76	kadu uddu	<i>Citrullus colocynthis</i>	Cucurbi taceae	Aug- Nov	Medicinal & Aromatic	N ₁ P ₁
77	Kadubilvapatre	<i>Coccinia grandis</i>	Cucurbi taceae	Nov- Dec	Vegetable	N ₂ P ₂
78	Kaduthene hullu	<i>Cucumis callosus</i>	Cucurbi taceae	Sept- Dec	Vegetable	N ₂ P ₁
79	Kamakasturi	<i>Diplocyclos palmatus</i>	Cucurbi taceae	Aug- Dec	Weeds	N ₁ P ₁
80	Kamala tavere	<i>Momordica cymbalaria</i>	Cucurbi taceae	Feb- April	Vegetable	N ₁ P ₁
81	kambali gida reshme gida	<i>Mukia Maderaspatana</i>	Cucurbi taceae	Aug- Dec	Medicinal & Aromatic	N ₂ P ₂
82	Kamra	<i>Trichosanthes tricuspidata</i>	Cucurbi taceae	Aug- Dec		N ₂ P ₂
83	Kandle mullu	<i>Cyperus</i>	Cypera	Aug-	Weeds	N ₁ P ₁

		<i>compressus</i>	ceae	Dec		
84	karchi Kayi	<i>Acalypha indica</i>	Euphorbiaceae	Aug-Dec	Weeds	N ₁ P ₁
85	Karebevu	<i>Breynia Vitis – idaea</i>	Euphorbiaceae			
86	karehindi	<i>croton bonplandianus</i>	Euphorbiaceae	July-Feb	Ornamental	N ₁ P ₁
87	Kari matti	<i>Eupharbia antiquorum</i>	Euphorbiaceae		Medicinal & Aromatic	
88	Karike	<i>Jatropha gandulifera</i>	Euphorbiaceae	Nov-Jan	Oil Seeds	N ₂ P ₂
89	Karimatti	<i>Kiraganelia reticulate</i>	Euphorbiaceae	Nov-Dec		N ₂ P ₂
90	Karnakundala	<i>phyllanthus embiica</i>	Euphorbiaceae	Sept-Dec	Trees	N ₁ P ₁
91	Kedige gida	<i>Ricinus communis</i>	Euphorbiaceae	June-July	Oil Seeds	N ₂ P ₂
92	Kempu burigadamara	<i>Securinega leucopyrus</i>	Euphorbiaceae	Feb-may		
93	kempu hanna hanchi	<i>Bauhinia malabarica</i>	Fabaceae	Aug-Sep	Trees	N ₂ P ₁
94	Kempuganajile	<i>C.auriculata</i>	Fabaceae	Aug-oct	Trees	N ₁ P ₁
95	Kesari mara	<i>Delonix elata</i>	Fabaceae	Jan-Feb	Trees	N ₂ P ₂
96	Khare mullina gida	<i>Hardwickia binate</i>	Fabaceae	Feb-April	Trees	N ₂ P ₁
97	Kireegara kele	<i>Pterolobium hexapetalum</i>	Fabaceae	Sept-Dec	Ornamental	N ₂ P ₁
98	Kotambri	<i>Tamarindus indica</i>	Fabaceae	Nov-Mar	Trees	N ₂ P ₁
99	Kukki balli	<i>Acacia catechu</i>	Fabaceae	Sept-jan	Trees	N ₁ P ₁
100	Kuppegida,tuppa kera	<i>Albizia amara</i>	Fabaceae	Mar-May	Trees	N ₁
101	Lakki gida	<i>A.lebbeck</i>	Fabaceae	Mar-Apr	Trees	N ₁
102	Madaki	<i>A.procera</i>	Fabaceae	Mar-Apr	Trees	N ₁
103	Maligana mara	<i>Dichrostachys cinerea</i>	Fabaceae	Oct-Jan	Trees	N ₂ P ₁

104	Mandhara pushpa gida	<i>Mimosa homata</i>	Fabaceae	Sept-Oct	Weeds	N ₁ P ₁
105	Manoranjini	<i>M.prainiana</i>	Fabaceae	Aug-Dec	Weeds	N ₁ P ₁
106	Maralu ummatli	<i>M.pudica</i>	Fabaceae	Sept-Oct	Weeds	N ₁ P ₁
107	Marasavate	<i>Neptunia triquetra</i>	Fabaceae			
108	Marvel hullu	<i>Pithecellobium dulce</i>	Fabaceae	March	Trees	N ₁
109	Mavina mara	<i>Prosopis cineraria</i>	Fabaceae	Mar-Apr	Trees	N ₁ P ₁
110	Mehndi gida madarangi	<i>P.Juliflora</i>	Fabaceae	Sept-feb	Trees	N ₁ P ₁
111	Mekkekayi balli	<i>Abrus precatorius</i>	Faboideae	Sept-Dec	Trees	N ₁ P ₁
112	Moogati soppu	<i>Crotalaria flipes benth</i>	Faboideae	Aug-Nov	Weeds	N ₁ P ₁
113	Mudre gida	<i>Butea monosperma</i>	Faboideae	Feb-april	Trees	N ₁ P ₁
114	Muguthigida	<i>Cajanus cajan</i>	Faboideae	July-oct	Pulse	N ₂ P ₂
115	Mullu Jaji	<i>Clitoria</i>	Faboideae	Aug-Dec	Ornamental	N ₂ P ₂
116	Mundu Kalli	<i>C.juncea</i>	Faboideae	July--Nov	Ornamental	N ₂ P ₁
117	Munji hullu	<i>Dalbergia latifolia</i>	Faboideae	Oct-Dec	Trees	N ₂ P ₂
118	Muthagada mara	<i>Derris indica</i>	Faboideae	Mar-June	Trees	N ₁ P ₁
119	Muttidare munni	<i>Erythrina indica</i>	Faboideae	Mar-June	Medicinal & Aromatic	N ₁ P ₁
120	Naribalada hullu	<i>Indigofera colutea</i>	Faboideae	Aug-Nov	Medicinal & Aromatic	N ₁ P ₁
121	Narigoodi	<i>Mucuna pruriens</i>	Faboideae	Oct-Feb	Plantation	N ₂ P ₂
122	Nasgunni	<i>Paracalyx scarriosus</i>	Faboideae			
123	Nayitulasi	<i>Phaseolus vulgaris</i>	Faboideae		Vegetable	
124	Neelatavare	<i>Pterocarpus marsupium</i>	Faboideae		Trees	

125	Neelgiri	<i>Rhynchosia minima</i>	Faboideae	Dec - Feb	Weeds	N ₂ P ₂
126	Neeru goobli gida	<i>Sesbania bispinosa</i>	Faboideae	Nov-Jan	Trees	N ₂ P ₂
127	Neerukayi gida	<i>Stylosaenstas fruticosa</i>	Faboideae	Jul-Aug		N ₁ P ₁
128	Nela rudrakshi	<i>Taverniera cuneifolia</i>	Faboideae	Nov - Dec		N ₂ P ₂
129	Nelabevu	<i>Tephrosia pumila</i>	Faboideae	Aug - Oct	Weeds	N ₁ P ₁
130	Nelarudrakshi	<i>Teramnus labialis</i>	Faboideae			
131	Nendinela bevu	<i>Vigna aconitifolia</i>	Faboideae	Aug-Nov	Field	N ₁ P ₁
132	Nerale	<i>Canscora diffusa</i>	Gentianaceae	Aug-Sep		N ₁ P ₁
133	Nerru kanagilu	<i>Swertia corymbosa</i>	Gentianaceae	Nov - Dec		N ₂ P ₂
134	Niru brahmi	<i>Salvia coccinea</i>	Lamiaceae		Weeds	
135	Nose hullu	<i>Leonitis</i>	Lamiaceae		Medicinal & Aromatic	
136	Nugge mara	<i>leucas plukenetti</i>	Lamiaceae	Sept-Dec	Weeds	N ₁ P ₁
137	ondelaga ,Brahmi	<i>Ocimum americanum L</i>	Lamiaceae	Sept-Nov	Medicinal & Aromatic	N ₂ P ₁
138	Oobu hullu	<i>O.basilicum L</i>	Lamiaceae	Jan-Dec	Medicinal & Aromatic	N ₂ P ₂
139	oodi mara	<i>O.sanctum L</i>	Lamiaceae	Jan-Dec	Medicinal & Aromatic	N ₂ P ₂
140	Ottati gida	<i>Cassytha filiformis</i>	Lauraceae	Aug-Sep		N ₁ P ₁
141	Oudala gida	<i>Asparagus gonoclados</i>	Liliaceae	Nov-Dec	Weeds	N ₂ P ₂
142	papas kalli	<i>Chlorophytum arundinaceum</i>	Liliaceae	Aug-sep		N ₁ P ₁
143	Perala gida	<i>Gloriosa superba</i>	Liliaceae	Nov-Jan	Herb	N ₂ P ₂
144	Pullampurachisoppu	<i>Linum mysorensense</i>	Linaceae	Oct-Dec	Medicinal & Aromatic	N ₂ P ₂
145	Punarnava	<i>lagerstroemia parviflora</i>	Lythraceae	Oct-Dec	Trees	N ₂ P ₂

146	Pundi balli	<i>Lawsonia inermis</i>	Lythrac eae	Sept- Oct	Trees	N ₁ P ₁
147	Rakta chandana	<i>Woodfordia fruticosa</i>	Lythrac eae	Oct- Dec	Trees	N ₂ P ₂
148	Ramphal	<i>Michelia champaca</i>	Magnol iaceae	June - Septe mber	Ornamental	N ₁ P ₁
149	Rubber hombu	<i>Abelmoschus ficulneus</i>	Malvac eae	May- Aug	Weeds	N ₂ P ₁
150	Sagari mullu gida	<i>Abutilon indicum</i>	Malvac eae	Aug- Oct	Weeds	N ₁ P ₁
151	Sampige	<i>Hibiscus rosa - sinensis</i>	Malvac eae	Jan- Dec	Ornamental	N ₂ P ₂
152	Sanna dabbe hullu	<i>Malvastrum coromandelianum</i>	Malvac eae	May- Aug	Ornamental	N ₂ P ₁
153	Sannabende	<i>Pavonia zeylanica</i>	Malvac eae	Sept- Nov	Ornamental	N ₂ P ₁
154	Sarpagandha	<i>Thespesia populnea</i>	Malvac eae	Oct- Nov		N ₂ P ₂
155	Sasuve	<i>Azadirachta indica</i>	Meliace ae	March - June	Trees	N ₂ P ₁
156	Seemae hunase	<i>Cocculus hirsutus</i>	Menisp ermace ae	Nov- Feb	Weeds	N ₂ P ₂
157	Senabu	<i>Morus indica</i>	Morace ae	Dec- Jan	Trees	N ₂ P ₂
158	Senabu	<i>Moringa oleifera</i>	Moring aceae	Nov- Jan	Vegetable	N ₂ P ₂
159	Shankapushpi gida	<i>Musa paradisiaca L</i>	Musace ae	Nov- Jan	Field	N ₂ P ₂
160	Shatamooli	<i>Callistemon speciosua</i>	Myrtac eae	Nov- March		N ₂ P ₁
161	Sithaphal	<i>Eucalyptus globulus</i>	Myrtac eae	Nov- Dec	Medicinal & Aromatic	N ₂ P ₂
162	Sri tulsi	<i>Psidium guajava</i>	Myrtac eae	Sept- Nov	Field	N ₂ P ₁
163	Srigandha	<i>Syzygium cumini</i>	Myrtac eae	May- Aug	Field	N ₂ P ₁
164	Surveymara, Eraimar a	<i>Nelumbo nucifera</i>	Nelumb onacea	May- Nov	Ornamental	N ₂ P ₁
165	Taremara	<i>Boerhavia chinensis</i>	Nelumb onacea	July- Sept	Weeds	N ₂ P ₁

166	Tega	<i>B.diffusa</i>	Nyctagi naceae	Sept- Dec	Weeds	N ₂ P ₁
167	Tengina mara	<i>Nymphaea nouchali</i>	Neyp haeaceae			
168	Thogari gida	<i>Oxalis corniculata</i>	Oxalida ceae	Oct- Dec	Weeds	N ₂ P ₂
169	Thripakshi gida	<i>Pandanus canaranus</i>	Pandan aceae	Nov- Dec		N ₂ P ₂
170	Tike soppu karibelli	<i>Argemone Mexicana</i>	Papaver a ceae	March -June	Weeds	N ₂ P ₁
171	Tingalavare	<i>Passiflora foetida</i>	Passiflo raceae	Sept- Nov	Field	N ₂ P ₁
172	Tondarasi	<i>Sesamum orientale</i>	Pedallia ceae	Aug- Jan	Oil Seeds	N ₁ P ₁
173	Tonde balli	<i>Plumbago zeylanica</i>	Plumba ginacea e	Nov- Jan	Ornamental	N ₂ P ₂
174	Totla gida	<i>Apluda mutica</i>	Poacea ce	Nov- Dec	Weeds	N ₂ P ₂
175	Tuglimara	<i>Cynodon dactylon</i>	Poacea ce	Oct- Dec	Weeds	N ₂ P ₂
176	Tumbe	<i>Dactyloctenium aegyptium</i>	Poacea ce	Sept- Dec	Weeds	N ₂ P ₁
177	Ummati gida	<i>Dichanthium annulatum</i>	Poacea ce	Nov- Dec	Weeds	N ₂ P ₂
178	Uttarani	<i>D.longiflora</i>	Poacea ce	Dec- Jan	Weeds	N ₂ P ₂
179	Utti gida	<i>Dinebra retroflexa</i>	Poacea ce	Dec- Feb	Weeds	N ₂ P ₂
180	Vadavarada gida	<i>Echinochloa colona</i>	Poacea ce	Sept- Dec	Weeds	N ₂ P ₁
181	Vasumani Hullu	<i>Eragrostis aspera</i>	Poacea ce	Oct- Nov	Weeds	N ₂ P ₂
182	Vishakanagile soppu	<i>Heteropogon contortus</i>	Poacea ce	June- Dec	Weeds	N ₁ P ₂
183	Vishamadri	<i>Imperata cylindrica</i>	Poacea ce	Oct- Dec	Weeds	N ₂ P ₂
184	Vishnukanti	<i>Lophogoa tridentatus</i>	Poacea ce	Oct- nov		N ₂ P ₂
185	Yekkada Gida	<i>Panicum trypheron</i>	Poacea ce	Oct- Nov		N ₂ P ₂
186	Yellu gida	<i>Pennisetum</i>	Poacea	Sept-	Weeds	N ₂ P ₁

		<i>hohenackeri</i>	ce	Dec		
187		<i>Rottboellia cohinchinensis</i>	Poacea ce	Sept- Dec	Weeds	N ₂ P ₁
188		<i>Saccharum arundinaceum</i>	Poacea ce		Weeds	
189		<i>Polygala arvensis</i>	Polygal aceae	Aug- Dec		N ₁ P ₁
190		<i>Polygonum glabrum</i>	Polygo naceae	Sept- Dec		N ₂ P ₁
191		<i>portulaca oleraceae</i>	Portula caceae	July- Sept	Ornamental	N ₂ P ₁
192		<i>P. quadrifida</i>	Portula caceae	Oct- Nov	Ornamental	N ₂ P ₂
193		<i>Punica granatum</i>	Punicac eae	Aug- Dec	Fruit	N ₁ P ₁
194		<i>Zizyphus mauritiana Lam</i>	Rhamn aceae	Oct- Dec	Fruit	N ₂ P ₂
195		<i>Borreria articularis</i>	Rubiace eae	Oct- Dec	Fruit	N ₂ P ₂
196		<i>Canthium parviflorum</i>	Rubiace eae	Nov- Dec	Medicinal & Aromatic	N ₂ P ₂
197		<i>Catunaregam spinosa</i>	Rubiace eae	Oct- Dec		N ₂ P ₂
198		<i>Ixora arborea</i>	Rubiace eae	Nov- Jan	Ornamental	N ₂ P ₂
199		<i>Morinda Pubescens</i>	Rubiace eae	Mar- May		N ₂ P ₁
200		<i>limonia acidissima</i>	Rutacea e			
201		<i>Murraya koenigii</i>	Rutacea e	Sept- Nov	Fruit	N ₂ P ₁
202		<i>Naringi crenulata</i>	Rutacea e			
203		<i>Salvadora persica</i>	Salvod oraceae			
204		<i>Santalum album</i>	Santala ceae	Aug- Feb	Medicinal & Aromatic	N ₁ P ₁
205		<i>Cardiospermum halicacabum</i>	Spinada ceae	Oct- Dec	Weeds	N ₂ P ₂
206		<i>Sapindus laurifolia</i>	Spinada ceae		Trees	

207		<i>Madhuca longifolia</i>	Sapotaceae	Feb-Mar	Trees	N ₁ P ₁
208		<i>Mimusops elengi</i>	Sapotaceae	May - Dec	Trees	N ₂ P ₂
209		<i>Bacopa monneira</i>	Sacrophulariaceae	July-Sept	Medicinal & Aromatic	N ₂ P ₁
210		<i>Stemodia viscosa</i>	Sacrophulariaceae		Weeds	
211		<i>Verbascum chinense</i>	Sacrophulariaceae	Sept-Jan		N ₂ P ₁
212		<i>Datura stramonium</i>	Solanaceae	Dec-mar	Weeds	N ₂ P ₁
213		<i>Solanum erianthum</i>	Solanaceae	Nov-Jan		N ₂ P ₂
214		<i>Withania Somnifera</i>	Solanaceae	Sept-Dec	Medicinal & Aromatic	N ₂ P ₁
215		<i>Sterculia foetida</i>	Sterculiaceae	Dec-Jan		N ₂ P ₂
216		<i>Waltheria indica</i>	Sterculiaceae	Oct-nov	Ornamental	N ₂ P ₂
217		<i>Tamarix ericoides</i>	Tamaricaceae		Medicinal & Aromatic	
218		<i>Corchorus capsularis</i>	Tiliaceae	Sept-oct	Fruit	N ₂ P ₁
219		<i>Grewia flavescens</i>	Tiliaceae	Oct-Dec	Medicinal & Aromatic	N ₂ P ₂
220		<i>Triumfetta rhomboidea</i>	Tiliaceae	Aug-Dec		N ₁ P ₁
221		<i>T.rotundifolia</i>	Tiliaceae	Sept-Dec		N ₂ P ₁
222		<i>Clerodendrum inerma</i>	Verbenaceae	Sept-Nov		N ₂ P ₁
223		<i>Duranta repens</i>	Verbenaceae	Jan-Dec	Medicinal & Aromatic	N ₂ P ₂
224		<i>Lantana camara</i>	Verbenaceae	Jan-Dec	Weeds	N ₂ P ₂
225		<i>Phyla nodiflora</i>	Verbenaceae	Dec-mar	Weeds	N ₂ P ₁
226		<i>stachytarpheta indica</i>	Verbenaceae	Nov-Mar	Weeds	N ₂ P ₂

227		<i>Tectona grandis</i>	Verbenaceae	Sept-Dec	Trees	N ₂ P ₁
228		<i>Vitex negunda</i>	Verbenaceae	Nov-Dec	Trees	N ₂ P ₂
229		<i>Cayratia auriculata</i>	Vitaceae	Nov-Feb	Vegetable	N ₂ P ₂
230		<i>Fagonia indica</i>	Zygophyllaceae	Dec-Mar	Medicinal & Aromatic	N ₂ P ₁

TABLE 2: FAMILY - WISE DISTRIBUTION OF BEE FLORA OF HONEYBEES IN KALABURGI REGION

SL.NO	FAMILY	NUMBER OF SPECIES	SL.NO	FAMILY	NUMBER OF SPECIES
1	Acanthaceae	9	39	Magnoliaceae	1
2	Aizoaceae	2	40	Malvaceae	6
3	Alangiaceae	1	41	Meliaceae	1
4	Amaranthaceae	5	42	Menispermaceae	1
5	Anacardiaceae	1	43	Moraceae	1
6	Annonaceae	4	44	Moringaceae	1
7	Apiaceae	2	45	Musaceae	1
8	Apocynaceae	5	46	Myrtaceae	4
9	Aracaceae	2	47	Nelumbonaceae	2
10	Asclepiadaceae	4	48	Nymphaeaceae	1
11	Asteraceae	9	49	Nyctaginaceae	1
12	Balsaminaceae	1	50	Oxalidaceae	1
13	Bignoniaceae	4	51	Pandanaceae	1
14	Bixaceae	1	52	Papaveraceae	1
15	Bombacaceae	1	53	Passifloraceae	1
16	Boraginaceae	1	54	Pedaliaceae	1
17	Brassicaceae	1	55	Plumbaginaceae	1
18	Burseraceae	1	56	Poaceae	15
19	Cactaceae	1	57	Polygalaceae	1
20	Cannaceae	1	58	Polygonaceae	1
21	Capparaceae	1	59	Portulacaceae	2

22	Caryophyllaceae	1	60	Punicaceae	1
23	Casuarinaceae	1	61	Rhamnaceae	1
24	Celastraceae	1	62	Rubiaceae	5
25	Chenopodiaceae	2	63	Rutaceae	3
26	Combretaceae	6	64	Sacrophulariaceae	3
27	Commelinaceae	3	65	Salvadoraceae	1
28	Convolvulaceae	4	66	Santalaceae	1
29	Cucurbitaceae	7	67	Sapotaceae	2
30	Cyperaceae	1	68	Solanaceae	3
31	Euphorbiaceae	9	69	Spinadaceae	2
32	Fabaceae	18	70	Sterculiaceae	2
33	Faboidceae	21	71	Tamaricaceae	1
34	Gentianaceae	2	72	Tiliaceae	4
35	Lamiaceae	6	73	Verbenaceae	7
36	Liliaceae	3	74	Vitaceae	1
37	Linaceae	1	75	Zygophyllaceae	1
38	Lythraceae	3			

2.4. Identification of bee flora:

For identification of prevailing bee flora resources in nature a keen visual observation was made on flowers and sometimes the binoculars were used , monthly visits to study sites on flowers at their blooming period to observe the activities of bees for a period of 5 to 10 minutes flowers, being visited at least by 3 to 4 bees within stipulated time were considered as bee flora base on frequency visitation of worker bee to a flower. For age value establish as low and high nectar and pollen rich plant.

2.5 Family wise distribution:

Family wise distribution of bee flora was also done by family names and how much number of species in each family belongs / scientific names.

2.6: Preparation of Bee flora Calendar:

During the survey on the basis of flowering of periods of the identified bee flora complete record was maintained and used for the preparation of bee flora calendar .Here the calendar was prepared according to 3 consecutive seasons and were arranged to the range of blooming period of bee flora. Here the flora calendar of kalaburgi region from October 2018- sep 2019 was done by binding colour and plant species month wise all the bee flora were included.

TABLE 4: Floral Calendar Of Kalaburgi Region Oct 2018 - Sep 2019

Sl.No	Plant species	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept
1	<i>Adhatoda zeyclanica</i>												
2	<i>Andrographis Paniculata</i>												
3	<i>Barleria prionitis</i>												
4	<i>Hygrophila auriculata</i>												
5	<i>Indoneesiella echioides</i>												
6	<i>justicia diffusa</i>												

7	<i>justicia Procumbens</i>												
8	<i>Lepidagathis cristata</i>												
9	<i>Peristrophe paniculata</i>												
10	<i>Trianthema portuclacastrum</i>												
11	<i>Zeleya decandra</i>												
12	<i>Alangium salvifolium</i>												
13	<i>Achyranthus aspera</i>												
14	<i>Aerva lanata</i>												
15	<i>Digera muricata</i>												
16	<i>Gomphrena celosoides</i>												
17	<i>Gomphrena globosa</i>												
18	<i>Magnifera indica</i>												
19	<i>Annona reticulate</i>												
20	<i>Annona squamosal</i>												
21	<i>Artabotrys hexapetalms</i>												
22	<i>Polyathia longifolia</i>												
23	<i>Centella asiatica</i>												
24	<i>Coriamdrum sativum</i>												
25	<i>Catharanthus pusillius</i>												
26	<i>Plumeria Rubra</i>												
27	<i>Rauwolfia Canescens</i>												
28	<i>Thevetia nerifolia</i>												
29	<i>Wrightia tinctoria</i>												
30	<i>cocos nucefera</i>												
31	<i>Phoenix Sylvestris</i>												
32	<i>Calotropis gigantean</i>												
33	<i>C.Procera</i>												
34	<i>Cryptostegia grandiflora</i>												
35	<i>Tylophora indica</i>												
36	<i>Acanthospermum hispidum</i>												
37	<i>Ageratum conyzoides</i>												
38	<i>Cosmos Sulphureus</i>												
39	<i>Parthenium hysterophorus</i>												
40	<i>Tricholepis radicans</i>												
41	<i>Tridax procumbens</i>												
42	<i>Veronia cinerea</i>												
43	<i>Vicoa indica</i>												
44	<i>Xanthium stirumarium</i>												
45	<i>Impatiens balsamina</i>												
46	<i>Dolichandrone falcate</i>												
47	<i>Kigelia pinnata</i>												
48	<i>Millingtonia hortensia</i>												
49	<i>Spathodea campanulata</i>												
50	<i>Bixa orellana L</i>												
51	<i>Bombax ceiba L.</i>												
52	<i>coldenia procumbens L</i>												

53	<i>Brassica juncea</i>												
54	<i>Boswellia serrate</i>												
55	<i>Opuntia dillenii</i>												
56	<i>Canna indica</i>												
57	<i>Capparis divaricate</i>												
58	<i>Polycarpon prostratum</i>												
59	<i>Casuarina equisetifolia</i>												
60	<i>Maytenus senegalensis</i>												
61	<i>Basella alba</i>												
62	<i>Chenopodium album</i>												
63	<i>Combretum Ovalifolium</i>												
64	<i>Terminalla alata</i>												
65	<i>Tarjuna</i>												
66	<i>T.bellirica</i>												
67	<i>T.chebula</i>												
68	<i>T.crenulata</i>												
69	<i>Commelina benghalensis</i>												
70	<i>Cyanotis fasciculata</i>												
71	<i>Rhoeo discolor</i>												
72	<i>Convolvulus stocksii</i>												
73	<i>Cuscuta reflexa</i>												
74	<i>Evolvulus alsinoides</i>												
75	<i>Ipomoea aquatic</i>												
76	<i>Citrullu colocynthis</i>												
77	<i>Conninia grandis</i>												
78	<i>Cucumis callosus</i>												
79	<i>Diplocyclos palmatus</i>												
80	<i>Momardica cymbalaria</i>												
81	<i>Mukia Maderaspatana</i>												
82	<i>Trichosanthes tricuspidata</i>												
83	<i>Cyperus compressus</i>												
84	<i>Acalypha indica</i>												
85	<i>Breynia Vitis -idaea</i>												
86	<i>croton bonplandianus</i>												
87	<i>Euphorbia antiquorum</i>												
88	<i>Jatropha gaudulifera</i>												
89	<i>Kiraganelia reticulata</i>												
90	<i>phyllanthus emblica</i>												
91	<i>Ricinus communis</i>												
92	<i>Securinega leucopyrus</i>												
93	<i>Bauhinia malabarica</i>												
94	<i>C.auriculata</i>												
95	<i>Delonix elata</i>												
96	<i>Hardwickia binata</i>												
97	<i>Pterolobium hexapetalum</i>												
98	<i>Tamarindus indica</i>												

99	<i>Acacia catechu</i>												
100	<i>Albizia amara</i>												
101	<i>A.lebbeck</i>												
102	<i>A.procera</i>												
103	<i>Dichrostachys cinerea</i>												
104	<i>Mimosa homata</i>												
105	<i>M.prainiana</i>												
106	<i>M.pudica</i>												
107	<i>Neptunia triquetra</i>												
108	<i>Pithecellobium dulce</i>												
109	<i>Prosopis cineraria</i>												
110	<i>P.Juliflora</i>												
111	<i>Abrus precatorius</i>												
112	<i>Crotalaria flipes benth</i>												
113	<i>Butea monosperma</i>												
114	<i>Cajanus cajan</i>												
115	<i>Clitoria ternatea L</i>												
116	<i>C.juncea</i>												
117	<i>Dalbergia latifolia</i>												
118	<i>Derris indica</i>												
119	<i>Erythrina indica</i>												
120	<i>Indigofera colutea</i>												
121	<i>Mucuna pruriens</i>												
122	<i>Paracalyx scarriosus</i>												
123	<i>Phaseolus vulgaris</i>												
124	<i>Pterocarpus marsupium</i>												
125	<i>Rhynchosia minima</i>												
126	<i>Sesbania bispinosa</i>												
127	<i>Stylosaenstas fruticosa</i>												
128	<i>Taverniera cuneifolia</i>												
129	<i>Tephrosia pumila</i>												
130	<i>Teramnus labialis</i>												
131	<i>Vigna aconitifolia</i>												
132	<i>Canscora diffusa</i>												
133	<i>Swertia corymbosa</i>												
134	<i>Leucas plukenetti</i>												
135	<i>Leonotis</i>												
136	<i>Ocimum americanum L</i>												
137	<i>O.basilicum L</i>												
138	<i>O.sanctum L</i>												
139	<i>Salvia coccinea</i>												
140	<i>Cassipha filiformis</i>												
141	<i>Asparagus gonoclados</i>												
142	<i>Chlorophytum arundinaceum</i>												
143	<i>Gloriosa superba</i>												
144	<i>Linum mysorensense</i>												

145	<i>lagerstroemia parviflora</i>												
146	<i>Lawsonia inermis</i>												
147	<i>Woodfordia fruticosa</i>												
148	<i>Michelia champaca</i>												
149	<i>Abelmoschus ficulneus</i>												
150	<i>Abutilon indicum</i>												
151	<i>Hibiscus rosa sinensis</i>												
152	<i>Malvastrum coromandeliam</i>												
153	<i>Pavonia zeylanica</i>												
154	<i>Thespesia populnea</i>												
155	<i>Azadirachta indica</i>												
156	<i>Cocculus hirsutus</i>												
157	<i>Morus indica</i>												
158	<i>Moringa oleifera</i>												
159	<i>Musa paradisiaca</i>												
160	<i>Callistemon speciosua</i>												
161	<i>Eucalyptus globulus</i>												
162	<i>Psidium guajava</i>												
163	<i>Syzygiumcumini</i>												
164	<i>Nelumbo nucifera</i>												
165	<i>Boerhavia chinensis</i>												
166	<i>B.diffusa</i>												
167	<i>Nymphaea nouchali</i>												
168	<i>Oxalis corniculata</i>												
169	<i>Pandanus canaranus</i>												
170	<i>Argemone Mexicana</i>												
171	<i>Passiflora foetida</i>												
172	<i>Sesamum orientale</i>												
173	<i>Plumbago zeylanica</i>												
174	<i>Apluda mutica</i>												
175	<i>Cynodon dactylon</i>												
176	<i>Dactyloctenium aegyptium</i>												
177	<i>Dichanthium annulatum</i>												
178	<i>Digitaria ciliaris</i>												
179	<i>Dinebra retroflexa</i>												
180	<i>Echinochloa colona</i>												
181	<i>Eragrostis aspera</i>												
182	<i>Heteropogon contortus</i>												
183	<i>Imperata cylindrica</i>												
184	<i>Lophogoan tridentatus</i>												
185	<i>Panicum trypheron</i>												
186	<i>Pennisetum hohenackeri</i>												
187	<i>Rottboellia cohinchinensis</i>												
188	<i>Saccharum arundinaceum</i>												
189	<i>Polygala arvensis</i>												
190	<i>Polygonum glabrum</i>												

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January 32.17%, august 26.95%,February 25.65%, July 14.78%, April 13.47%, June 11.73% and lastly the month of May 11.30%.

Table 5:Floral Calendar Of Percent Abundance Of Bee Flora of Kalaburgi Region FromOct 2018 - Sep2019

Sl.N	Plant species	Oct	Nov	Dec	Ja	Feb	Mar	Apri	Ma	Jun	Jul	Aug	Sept
1	<i>Adhatoda zeyclanica</i>	1	1										1
2	<i>Andrographis Paniculata</i>	1	1	1								1	1
3	<i>Barleria prionitis</i>	1											1
4	<i>Hygrophila auriculata</i>				1	1							
5	<i>Indoneesiella echioides</i>	1											1
6	<i>justicia diffusa</i>	1	1	1									1
7	<i>justicia Procumbens</i>			1	1								
8	<i>Lepidagathis cristata</i>	1	1								1	1	1
9	<i>Peristrophe paniculata</i>	1	1										1
10	<i>Trianthema portuclacastrum</i>	1	1	1							1	1	1
11	<i>Zeleya decandra</i>	1	1									1	1
12	<i>Alangium salvifolium</i>	1	1	1									1
13	<i>Achyranthus aspera</i>	1	1										
14	<i>Aerva lanata</i>	1	1	1								1	1
15	<i>Digera muricata</i>	1	1									1	1
16	<i>Gomphrena celosoides</i>												
17	<i>Gomphrena globosa</i>												
18	<i>Magnifera indica</i>										1	1	1
19	<i>Annona reticulate</i>			1	1								
20	<i>Annona squamosal</i>										1	1	
21	<i>Artabotrys hexapetalms</i>			1	1	1	1	1	1	1	1	1	
22	<i>Polyathia longifolia</i>				1	1	1						
23	<i>Centella asiatica</i>	1	1	1						1	1	1	1
24	<i>Coriamdrum sativum</i>	1	1	1	1	1	1	1	1	1	1	1	1

25	<i>Catharanthus pusillius</i>	1	1	1	1								1
26	<i>Plumeria Rubra</i>			1	1	1	1						
27	<i>Rauwolfia Canescens</i>			1	1	1	1						
28	<i>Thevetia nerifolia</i>		1	1	1	1							
29	<i>Wrightia tinctoria</i>	1	1	1									1
30	<i>cocos nucifera</i>	1	1	1	1	1	1	1	1	1	1	1	1
31	<i>Phoenix Sylvestris</i>	1	1	1	1	1	1	1	1	1	1	1	1
32	<i>Calotropis gigantean</i>	1	1	1	1	1	1	1	1	1	1	1	1
33	<i>C.Procera</i>	1	1	1	1	1	1	1	1	1	1	1	1
34	<i>Cryptostegia grandiflora</i>			1	1	1	1						
35	<i>Tylophora indica</i>				1	1	1	1					
36	<i>Acanthospermum hispidum</i>		1	1									
37	<i>Ageratum conyzoides</i>		1	1	1	1							
38	<i>Cosmos Sulphureus</i>	1										1	1
39	<i>Parthenium hysterophorus</i>	1	1	1	1	1	1	1	1	1	1	1	1
40	<i>Tricholepis radicans</i>	1	1	1	1								1
41	<i>Tridax procumbens</i>	1	1	1	1	1	1	1	1	1	1	1	1
42	<i>Veronia cinerea</i>	1	1	1	1								1
43	<i>Vicoaindica</i>	1	1	1	1	1							1
44	<i>Xanthium stirumarium</i>	1	1	1	1	1							1
45	<i>Impatiens balsamina</i>	1	1	1	1								1
46	<i>Dolichandrone falcate</i>			1	1	1							
47	<i>Kigelia pinnata</i>			1	1	1							
48	<i>Millingtonia hortensia</i>				1	1	1						
49	<i>Spathodea campanulata</i>				1	1	1	1					
50	<i>Bixa orellana L</i>												
51	<i>Bombax ceiba L.</i>		1	1	1	1							
52	<i>coldenia procumbens L</i>				1	1	1	1					

53	<i>Brassica juncea</i>		1	1	1								
54	<i>Boswellia serrate</i>		1	1									
55	<i>Opuntia dillenii</i>					1	1	1					
56	<i>Canna indica</i>			1	1	1							
57	<i>Capparis divaricate</i>			1	1	1							
58	<i>Polycarpon prostratum</i>		1	1									
59	<i>Casuarina equisetifolia</i>		1	1									
60	<i>Maytenus senegalensis</i>			1	1	1							
61	<i>Basella alba</i>				1	1							
62	<i>Chenopodium album</i>				1	1							
63	<i>Combretum Ovalifolium</i>	1	1										
64	<i>Terminalia alata</i>					1	1						
65	<i>Tarjuna</i>	1	1	1								1	1
66	<i>T.bellirica</i>		1	1									
67	<i>T.chebula</i>		1	1									
68	<i>T.crenulata</i>												
69	<i>Commelina benghalensis</i>	1	1	1	1								
70	<i>Cyanotis fasciculata</i>	1											1
71	<i>Rhoeo discolor</i>	1	1	1	1	1	1						1
72	<i>Convolvulus stocksii</i>												
73	<i>Cuscuta reflexa</i>				1	1	1						
74	<i>Evolvulus alsinoides</i>	1	1										
75	<i>Ipomoea aquatic</i>	1	1	1	1	1	1	1	1	1	1	1	1
76	<i>Citrullus colocynthis</i>	1	1									1	1
77	<i>Connarus grandis</i>		1	1									
78	<i>Cucumis callosus</i>	1	1	1									1
79	<i>Diplocyclos palmatus</i>	1	1	1								1	1
80	<i>Momordica cymbalaria</i>					1	1	1					

81	<i>Mukia Maderaspatana</i>	1	1	1								1	1
82	<i>Trichosanthes tricuspidata</i>	1	1	1								1	1
83	<i>Cyperus compressus</i>	1	1	1								1	1
84	<i>Acalypha indica</i>	1	1	1								1	1
85	<i>Breynia Vitis –idaea</i>												
86	<i>croton bonplandianus</i>	1	1	1	1	1					1	1	1
87	<i>Eupharbia antiquorum</i>												
88	<i>Jatropha gandulifera</i>		1	1	1								
89	<i>Kiraganelia reticulate</i>		1	1									
90	<i>phyllanthus embiica</i>	1	1	1									1
91	<i>Ricinus communis</i>									1	1		
92	<i>Securinega leucopyrus</i>					1	1	1	1				
93	<i>Bauhinia malabarica</i>											1	1
94	<i>C.auriculata</i>	1										1	1
95	<i>Delonix elata</i>				1	1							
96	<i>Hardwickia binate</i>					1	1	1					
97	<i>Pterolobium hexapetalum</i>	1	1	1									1
98	<i>Tamarindus indica</i>		1	1	1	1	1						
99	<i>Acacia catechu</i>	1	1	1	1								1
100	<i>Albizia amara</i>						1	1	1				
101	<i>A.lebbeck</i>						1	1					
102	<i>A.procera</i>						1	1					
103	<i>Dichrostachys cinerea</i>	1	1	1	1								
104	<i>Mimosa homata</i>	1											1
105	<i>M.prainiana</i>	1	1	1								1	1
106	<i>M.pudica</i>	1											1
107	<i>Neptunia triquetra</i>												
108	<i>Pithecellobium dulce</i>						1						

109	<i>Prosopis cineraria</i>						1	1					
110	<i>P.Juliflora</i>	1	1	1	1	1							1
111	<i>Abrus precatorius</i>	1	1	1									1
112	<i>Crotalaria flipes benth</i>	1	1									1	1
113	<i>Butea monosperma</i>					1	1	1					
114	<i>Cajanus cajan</i>	1									1	1	1
115	<i>Clitoria ternatea L</i>	1	1	1								1	1
116	<i>C.juncea</i>	1	1								1	1	1
117	<i>Dalbergia latifolia</i>	1	1	1									
118	<i>Derris indica</i>						1	1	1	1			
119	<i>Erythrinsa indica</i>						1	1	1	1			
120	<i>Indigofera colutea</i>	1	1									1	1
121	<i>Mucuna pruriens</i>	1	1	1	1	1							
122	<i>Paracalyx scarriosus</i>												
123	<i>Phaseolus vulgareas</i>												
124	<i>Pterocapus marsupium</i>												
125	<i>Rhynchosia minima</i>			1	1	1							
126	<i>Sesbania bespinosa</i>		1	1	1								
127	<i>Stylosaenstas fruticosa</i>										1	1	
128	<i>Taverniera cuneifolia</i>		1	1									
129	<i>Tephrosia pumila</i>	1										1	1
130	<i>Teramnus labialis</i>												
131	<i>Vigna aconitifolia</i>	1	1									1	1
132	<i>Canscora diffusa</i>											1	1
133	<i>Swertia corymobsa</i>		1	1									1
134	<i>Leucas plukenetti</i>	1	1	1									
135	<i>Leonotis</i>												
136	<i>Ocimum americanum L</i>	1	1										1

137	<i>O.basilicum L</i>	1	1	1	1	1	1	1	1	1	1	1	1
138	<i>O.sanctum L</i>	1	1	1	1	1	1	1	1	1	1	1	1
139	<i>Salvia coccinea</i>												
140	<i>Cassytha filiformis</i>											1	1
141	<i>Asparagus gonoclados</i>		1	1									
142	<i>Chlorophytum arundinaceum</i>											1	1
143	<i>Gloriosa superba</i>		1	1	1								
144	<i>Linum mysorensense</i>	1	1	1									
145	<i>lagerstroemia parviflora</i>	1	1	1									
146	<i>Lawsonia inermis</i>	1											1
147	<i>Woodfordia fruticosa</i>	1	1	1									
148	<i>Michelia champaca</i>									1	1	1	1
149	<i>Abelmoschus ficulneus</i>								1	1	1	1	
150	<i>Abutilon indicum</i>	1										1	1
151	<i>Hibiscus rosa sinensis</i>	1	1	1	1	1	1	1	1	1	1	1	1
152	<i>Malvastrum coromandeliam</i>								1	1	1	1	
153	<i>Pavonia zeylanica</i>	1	1										1
154	<i>Thespesia populnea</i>	1	1										
155	<i>Azadirachta indica</i>						1	1	1	1			
156	<i>Cocculus hirsutus</i>		1	1	1	1							
157	<i>Morus indica</i>			1	1								
158	<i>Moringa oleifera</i>		1	1	1								
159	<i>Musa paradisiaca</i>		1	1	1								
160	<i>Callistemon speciosua</i>		1	1	1	1	1						
161	<i>Eucalyptus globulus</i>		1	1									
162	<i>Psidium guajava</i>	1	1										1
163	<i>Syzygiumcumini</i>								1	1	1	1	
164	<i>Nelumbo nucifera</i>	1	1						1	1	1	1	1

165	<i>Boerhavia chinensis</i>										1	1	1
166	<i>B.diffusa</i>	1	1	1									1
167	<i>Nymphaea nouchali</i>												
168	<i>Oxalis corniculata</i>	1	1	1									
169	<i>Pandanus canaranus</i>		1	1									
170	<i>Argemone Mexicana</i>						1	1	1	1			
171	<i>Passiflora foetida</i>	1	1										1
172	<i>Sesamum orientale</i>		1	1	1							1	1
173	<i>Plumbago zeylanica</i>		1	1	1								
174	<i>Apluda mutica</i>		1	1									
175	<i>Cynodon dactylon</i>	1	1	1									
176	<i>Dactyloctenium aegyptium</i>	1	1	1									1
177	<i>Dichanthium annulatum</i>		1	1									
178	<i>Digitaria ciliaris</i>	1	1										1
179	<i>Dinebra retroflexa</i>			1	1	1							
180	<i>Echinochloa colona</i>	1	1	1									1
181	<i>Eragrostis aspera</i>	1	1										
182	<i>Heteropogon contortus</i>	1	1	1						1	1	1	1
183	<i>Imperata cylindrica</i>	1	1	1									
184	<i>Lophogoan tridentatus</i>	1	1										
185	<i>Panicum trypheron</i>	1	1										
186	<i>Pennisetum hohenackeri</i>	1	1	1									1
187	<i>Rottboellia cohinchinensis</i>	1	1	1									1
188	<i>Saccharum arundinaceum</i>												
189	<i>Polygala arvensis</i>	1	1	1								1	1
190	<i>Polygonum glabrum</i>	1	1	1									1
191	<i>portulaca oleraceae</i>										1	1	1
192	<i>P.quadrifida L</i>	1	1										

193	<i>Punica granatum</i>	1	1	1								1	1
194	<i>Zizyphus mauritiana Lam</i>	1	1	1									
195	<i>Borreria articularis</i>	1	1	1									
196	<i>Canthium parviflorum</i>		1	1									
197	<i>Catunaregam spinosa</i>	1	1	1									
198	<i>Ixora arborea</i>		1	1	1								
199	<i>Morinda Pubescens</i>						1	1	1				
200	<i>limonia acidissima</i>												
201	<i>Murraya koenigii</i>	1	1										1
202	<i>Naringi crenulata</i>												
203	<i>Salvadora persica</i>												
204	<i>Santalum album</i>	1	1	1	1	1						1	1
205	<i>Cardiospermum halicacabum</i>	1	1	1									
206	<i>Sapindus laurifolia</i>												
207	<i>Madhuca longifolia</i>					1	1						
208	<i>Mimusops elengi</i>	1	1	1					1	1	1	1	1
209	<i>Bacopa monneira</i>										1	1	1
210	<i>Stemodia viscosa</i>												
211	<i>Verbascum chinense</i>	1	1	1	1								1
212	<i>Datura stramonium</i>			1	1	1	1						
213	<i>Solanum erianthum</i>		1	1	1								
214	<i>Withania Somnifera</i>	1	1	1									1
215	<i>Sterculia foetida</i>			1	1								
216	<i>Waltheria indica</i>	1	1										
217	<i>Tamarix ericoides</i>												
218	<i>Corchorus capsularis</i>	1											1
219	<i>Grewia flavescens</i>	1	1	1									
220	<i>Triumfetta rhomboidea</i>	1	1	1								1	1

221	<i>T.rotundifolia</i>	1	1	1									1
222	<i>Clerodendrum inerma</i>	1	1										1
223	<i>Duranta repens</i>	1	1	1	1	1	1	1	1	1	1	1	1
224	<i>Lantana camara</i>	1	1	1	1	1	1	1	1	1	1	1	1
225	<i>Phyla nodiflora</i>			1	1	1	1						
226	<i>stachytarpheta indica</i>		1	1	1	1	1						
227	<i>Tectona grandis</i>	1	1	1									1
228	<i>Vitex negunda</i>		1	1									
229	<i>Cayratia auriculata</i>		1	1	1	1							
230	<i>Fagonia indica</i>			1	1	1	1						
	TOTAL	113	136	127	74	59	47	31	26	27	34	62	99
	PERCENT BEE FLORA ABUNDANCE	49.1	59.1	55.2	32	25.	20.4	13.4	11.3	11.7	14.	26.9	43.0
		3	3	1	17	65	3	7	0	3	78	5	4

3. Results and discussion :

The area of study under the agro crops and covered with plantations. In order to develop a comprehensive picture of the scenario of bee pollinators, field extensive and intensive field observation are required, therefore bee flora and floral calendar was documented under the field conditions in Kalaburagi region. The field observations were recorded during October 2018 to September 2019. The flora of Kalaburagi region were categorized to 11 groups they are plantations, vegetables, weeds, oil seeds, trees, ornamental plants, medicinal and aromatic plants, pulses, herbs, fruits, field crops. The result revealed that in Kalaburagi region 230 plant species were useful to honey bees out of which vegetables 16, fruits 15, oil seed 8, pulses

2, ornamental 49, medicinal and aromatic 78, herbs 2, plantations 6, weeds 109, trees 78, field crops 12. There were respectively documented and found in the study area. In the study area major plants were recorded in the month of November Andrographis paniculata, Justicia diffusa, Lepiorogathis cristata, Trianthema, Aerva lanata, Annona reticulata, Digera muriculata, Coriaria drum, sativa, Albium respectively and followed by the month of December. Here the nectar collection was more than the pollen. These plants are followed by month wise respectively. The following plants of the area having good value, so honey bees visited these plants extensively for honey production.

Conclusion:

The present finding revealed that in Kalaburagi region 230 plant species were useful to honey bees out of which vegetables 16, fruits 15, plantation 6, weeds 109, trees 78, medicinal and aromatic 45, ornamental plants 49, oil seeds 8, pulses 2, field 12, herbs 2 respectively documented and found in the study area. The identified flora was further grouped into pollen, nectar, both pollen nectar yielding plants. Honey bee plants have a special symbiotic relationship. Bee flora is important for establishing bee keeping industry. The awareness to maintain the existing bee flora and multiplication of plant species is important for its sustainability. Plant types and their flowering duration differ from one place to other due to variation in topography. Climate conditions frequent and moderate visit on flower clear that honey bees preferred all the plants as a major food source. From the above discussion, it can be concluded that Kalaburagi region can be considered appropriate area for initiation to improve the livelihood for the farmers about natural food availability in particular month and power to make decision for sustainable bee keeping. As we have a very good bee flora in Kalaburagi region so based on available flora, major characteristics of these plant species pollen and nectar availability and flowering duration a bee floral calendar as per the season were developed to consume these floras. Attention must be given to maintain and

multiply the existing flora. These records of bee flora during the study encourages their conservation of honey bees in future as well.

As honey bees are the essential of crop ecosystem by pollinating wide range of crops.

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The heading should be treated as a 3rd level heading and should not be assigned a number.

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