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HONEY BEE FLORA AND FLORAL CALENDER IN NORTH ZONE OF CHHATTISGARH

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Abstract: A study was conducted at Surguja district of Chhattisgarh during 2014-15 to identify the bee flora and to develop the floral calendar for honey bee. Based on the interview with the beekeepers and visual observations, some important plant species were identified as a major source of flora for honey bee. Spring season (March to June) autumn season (July to October) identified as critical dearth period with a few flowering plants. Winter season (November to February) identified as honey flow period having a number of floral plants viz. *Guizotia abyssinica*, *Brassica spp*., *Citrus spp*., *Cajanus cajan*, *Eucaliptus*, Mango, Shisham, Semal, Pea, ornamental plants-Popy, Calendula, Nastertium, Holyhock, *Justicia*, *Berbina*, weed flora *Ageratum conyzoides, Bidens pilosa*, and medicinal plants like Adusa, Bhring raj, Justicia, aswagandha, karanj were the major bee flora. This season was identified as the most suitable for initiation and promotion of beekeeping practices.

Keywords: Bee Flora, Beekeeping, Floral calendar

INTRODUCTION

Beekeeping is an important farming activities in Surguja district of Chhattisgarh since ancient times. Some beekeepers are rearing the Indian honey bee *Apis cerana indica* Fabr. to fetch the honey from their beehive. Being a non- land based enterprise the beekeeping is increasing in this region. The success of beekeeping is depends upon the different factors, among them, the avaibility of bee flora and its duration is one of them. Longer the duration of the avaibility of flora nectar or pollen or both more suitable will be the area for beekeeping. In this region inadequate experience and knowledge about the bee flora is facing the problem, those farmers who are interested in beekeeping they trap the *Apis cerana indica* Fabr. from the hole of the trees ,termitarium of termite, cracks of buildings etc. and keeps it into their small size beehive called Newton's bee hive. When the avaibility of bees any month of the year and they do not manage the bee colony especially in the month of (May-June and July-August) the dearth period. During rainy season the wax moth is the major problem for swarming the honey bee. In this hilly region winter season is the most suitable for initiation of the bee keeping because of this period is abundant flora of rabi crops, fruits and ornamental and weeds flora are available. During this period the forest trees are also available abundant flora for honey bees (Shaw *et al*. 2008).

MATERIAL AND METHOD

A study was undertaken in the vicinity of *Apis cerana indica* Fabr. apiary of Raj Mohini Devi, College of Agriculture and Research Station, Ambikapur and beekeeper's apiary by survey during 2011-12. Geographically, Ambikapur (Surguja) is located at an altitude of 20.8' North, at latitude of 83.15'east and at a height of 592.62 MSL. On the basis of beekeeper's interview in the village mainly common and local names of different flowering plants of that area and apiary seasonal plants were characterized by making visual observations on bee activity pertaining to collection of nectar, pollen or both during the flowering period of each individual plant species. The plants either crops or trees or weeds or ornamentals were listed accordingly to the source for which they were visited by bees like nectar,(N), pollen (P) or both (N+P). These observations were recorded for one kilometer of radius of apiary and farmer's field.

Table 1. Different honey bee flora avaibable in Surguja district of Chhattisgarh.

SN.	Common name	Scientific name	Family	Blooming period	Source
1.	Brinjal	*Solanum melongena* L.	Solanaceae	Round year	N+P
2.	Chilly	*Capsicum annum*	Solanaceae	--do---	N
3.	Shimla mirch	*Capsicum annum* L.	Solanaceae	-----do----	N
4.	Tomato	*Lycopersicon esculentum*	Solanaceae	-----do----	P
5.	Onion	*Allium cepa L.*	Liliaceae	Feb-May	N+P
6.	Radish	*Raphanus sativus*	Cruciferae	Oct-April	N+P
7.	Sesamum	*Sesamium orientale* L.	Pedaliaceae	August-Oct	N+P
8.	Sunflower	*Helianthus annus* L.	Astraceae	Round year	P

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9.	Niger	*Guizotia abyssinica*	Compositae	Oct-Mar	N+P
10.	Mustard	*Brassica campestris*	Cruciferae	---do----	N+P
11.	Buckwheat	*Fagopyrum esculentum*	Poligonaceae	Sep-Feb.	N+P
12.	Arhar	*Cajanus cajan*	Leguminoceae	Sep-Apr.	N+P
13.	Moong	*Vigna radiata*	--do---	Aug-Oct	N
14.	Gram	*Cicer arietinum*	---do--	Dec-Feb	P
15.	Lentil	Lens esculenta L.	-----do----	-----do----	P
16.	Lathyrus	*Lathyrus sativus*	Leguminaceae	Dec-Feb	N+P
17.	Pea	*Pisum sativum*	Leguminaceae	Nov-Feb	N+P
18.	Maize	*Zea mays* L.	Graminae	Round year	P
19.	Corinder	*Coriandrum sativum*	Umbelliferae	Nov-Feb.	N+P
20.	Methi	*Trigonella foenumgraecum*	Leguminaceae	----do---	N+P
21.	Bhindi	*Abelmoschus esculentus*	Malvaceae	Sep-Aug	N+P
22.	Carrot	*Dacus carota* L.	Umbelliferae	Oct-Mar	N+P
23.	Turnip	*Brassica rapa* L.	Cruciferae	--do--	N+P
24.	Sakarkand	*Ipomoea batatas*	Convolvulaceae	Sep-Nov	N+P
25.	Rice	*Oryza sativa*	Graminae	Sep-Dec	P
26.	Bottle gourd	*Lagenaria siceraria*	Cucurbitaceae	Round year	N+P
27.	Bitter gourd	*Momordica charantia*	Cucurbitaceae	Round year	N+P
28.	Pumpkin	*Lagenaria vulgaris*	Cucurbitaceae	Aug-Jan	P
29.	cucumber	*Cucumis sativus*	Cucurbitaceae	Round year	N+P
30.	Cabbage	*Brassica oleracea* L.	Criciferiae	Oct-Mar	P
31.	Cauliflower	*B.O. var.botrytis*	----d----	-----do----	P
32.	Knol khol	*B. caulorapa* L.	-----do----	----do---	P
		Fruit and Forest Trees			
33.	Guava	*Psidium guajava* L.	Myrtaceae	AprMayJul-Aug	N+P
34.	papaya	*Carica papaya* L.	Caricaceae	Round year	N
35.	Mango	*Mangifera indica* L.	Anacardiceae	Mar-Apr	N
36.	Citrus	*Citrus limon* L.	Rutaceae	Nov-feb	N+P
37.	Litchi	*Litchi chinensis* Sonn.	Sapindaceae	Mar-Apr	N+P
38.	Banana	*Musa paradisiacal*	Musaceae	Round Year	N+P
39.	Ber	*Zizyphus jajuba* Lam.	Rhamnaceae	Sep-Oct	N
40.	Tamarind	*Tamarindus indica*	Leguminoceae	May-Jul	N+P
41.	Jamun	*Syzygium cumini* L.	Myrtaceae	Apr-May	N+P
42.	Moringa	*Moringa olefera*	Morigiceae	Nov-May	N
43.	Neem	*Azadirachta indica* Juss.	Meliaceae	April	N
44.	Semal	*Bombax ceiba* L.	Bombacaceae	Dec-Mar	N
45.	Shisham	*Dalbergia sisoo*	Papilionaceae	Mar-Apr	N+P
46.	Kachnar	*Bauhinia variegata*	Caesalpiniaceae	Sep-Nov	N+P
47.	Kapok	*Ceiba pentendra*	Bombacaceae	Mar-Apr	N+P
48.	Gulmohar	*Delonix regia*	Bignoniaceae	Apr-June	P
49.	Arjun	*Terminalia arjuna Rox.*	Combretaceae	Apr-May	N+P
50.	Bamboo	*Dendrocalemus strictusness*	Poaceae	Apr-May	N+P
51.	Bottlebrush	*Callistemon lanceolatus*	Myrtaceae	Mar-Apr	N+P
52.	Dhwai	*Woodfordia fructicosa*	Lythraceae	Oct-Apr	N
53.	Coffee	*Coffee arabica*	Rubiaceae	Apr-May	N
54	Sal	*Sorea robusta*		Apr-May	N
		Ornamental plants			
55.	Dahlia	*Dahlia Spp.*	Astraceae	Nov-May	N+P
56.	Marigold	*Tagetes erecta*	Compositae	Oct-May	N+P
57.	Dianthus	*Dianthus caryophyllus*	Caryophllaceae	Jan-Apr	N
58.	Balsum	*Impatiens balsemina* L.	Balsaminaceae	Jan-Apr	N
59.	Aster	*Callistephus chinensis*	Compositae	Dec-Mar	N
60.	Calendula	*Calendula officinalis*	Astraceae	Jan-May	N
61.	Pitunia	*Petunia axillaries*	Solanaceae	Jan-Apr	P
62.	Nastertium	*Nastertium tropaeolummajus*	Tropaeolaceae	Jan-May	N+P
63.	Popy	*Papaverdubium* L.	Paperveraceae	Jan-Apr	P

64.	Hollyhock	*Hollyhock althacrosie*	Malvaceae	Jan-Apr	P
65.	Ginia	*Zinnea elegans*	Balsaminaceae	Dec-Apr	P
66.	Phlox	*Phlox drummondii*	Polimoniaceae	Jan-Apr	N
67.	Berbina	*Verbena hybrida*	Verbanaceae	Jan-Apr	N
68.	Portulaca	*Portulaca olercea*	Oleraceae	Jan-Mar	P
69.	Cosmos	*Cosmos sulphureus* Cas.	Compositae	Dec-Mar	N+P
70.	Cock's comb	*Celosia plumose* L.	Amaranthaceae	Oct-Feb	N
71.	Cornflower	*Centaurea cyanii* L.	Astraceae	Dec-may	P
	Weed flora				
72.	Wild sunhemp	*Crotolaria verracosa*	Leguminaceae	Sep-Feb	N+P
73.	Water freworst	*Bidens pilosa*	Astraceae	Round year	N+P
74.	Basnahi	*Ageratum conyzoides* L.	Astraceae	Round year	P
	Medicinal Plants				
75	Adusa	*Adhatoda vasica*	Acanthaceae	Round Year	N
76	Aswagandha	*Withnia somnifera*	Solanaceae	Oct-March	N+P
77	Bhringraj	*Eclipta alba*	Asteraceae	Round Year	N+P
78	karanj	*Pongamia pinnata*	Fabaceae	March April	N
79	Justicia	*Justicia gendarusa*	Acanthaceae	March-April	N

N-Nectar, P-Pollen

RESULT AND DISCUSSION

Honeybee species and beekeeping practices

On the basis of farmer's experience, three different honey bees species were found in Surguja region. They were Indian honey bees (*Apis cerana indica* F.) ,little honey bee (*Apis florae* F.), and rock bee (*Apis dorsata* F.). The predominant species were *Apis dorsata* F., followed by *Apis cerana indica* F. and *Apis florae* F.(Atwal *et al*.1970).

Apis cerana indica was the predominantly species in this region. Only this species can be domesticated because this species was easily available naturally in termitarium, cracks of walls and holes of trees etc. In this region those peoples who were interested in beekeeping they traped the *Apis cerana indica* and kept it into the beehives and harvested the honey from them. These beekeepers harvesting honey on an average of 10-12 kg. honey per colony per year.

Honey flow and Dearth periods

In Surguja region the peak periods of honeybees foraging activity were recorded during October – February. During this season, abundant bee floral plants were found blooming with mild temperature and little or no rainfall. Some plants and crops species such as *Brassica species, Guizotia abyssinica*, *Cajanus cajan*, *Pisum sativum*, *Zea maize*, *Oryza sativa*, *Sesamum indicum*, *Fagopyrum esculantum*, *Allium cepa*, *coriandrum sativum*, *Raphanus sativum*, *Hellianthus annus* etc were the major crop flora. Honeybees visited these plants extensively for honey production and colony multiplication. Winter season (Nov-Feb.) was the honey flow period most suitable for honey production for this region. Spring season (March-June) partially dearth period because of least bee flora were available. Autumn season (July-Oct.) boths this season were recorded dearth period least number of bee floras were available. Bhatia (2007), Sharma and Raj (1985) has also noted about the bee flora.

Plantation of bee floral plants

Due to variation in altitude and climatic condition, this region was suitable for growing various multipurpose plants such as *Psidium guajava*, *Citrus spp*., *Litchi chinensis*, *Mangifera indica*, *Eucalyptus spp*, *Moringa olifera*, *Azadirachta indica*, *Zizyphus jujuba*, *Acasia arabica*, *Bombax ceiba*, *Madhuka indica*, *Tamarindus indica*, *Pongamia pinnata*, *Dalbargia sisoo*, *Syzygium cumini*, *Bauhinia varigata*, *Ceiba pentendra*, *Jacaranda mimosifolia*, *Terminalia arjuna*, *Bambusa bambos*, *Terminalia ballerica*, etc. should be planted for honey bee flora. It was also noted by Singh and Singh (1980).

Seasonal ornamental plants

Some ornamental plants which were observed as a good source of pollen and nectar or both such as *Jasticia gendrussa*, *Salvia splendens*, *Helichrysum bracteanum*, *Dianthus caryophyllus*, *Impatiens balsemina*, *Callistephus chinensis*, *Calendula officinalis*, *Petunia axillaries*, *Tropa colummajus*, *Papaver dubium*, *Hollyhock althacrosie*, *Zinnea elegens*, *Phlox drummondii* ,*Verbena hybrida*, *Celosia plumose*, *Centaurea cyanii* and same suggestions were given by Chand and Singh (2005).

Weed Flora

Some weeds were identified as a good source of bee flora as a nectar or pollen or both for this region viz- *Bidens pilosa*, *Azeratum conizoides*, *Crotolaria verracosa*. These were weeds naturally available in abundant and in which *Apis cerana indica was* visited predominantly.

Medicinal plants

During the study period, some medicinal plants were also visited by the honeybees plants like *Adhatoda vasica*, *Justicia gendarusa*, *Eclipta alba*, *Vithania somnifera*, and *Pongamiya pinnata* etc. were visited. Looking the visitation by foraging bees, this plans can be planted for initiation and promotion for beekeeping activities in this region .

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