



## Pollen Analysis of Honey Samples from Different Geographic area of Bhandara District of Maharashtra

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### Abstract:

The study represents the pollen contents of 5 honey samples of natural honey bee hives of *Apis cerana indica* in summer season collected from the different geographic regions of Bhandara district of Maharashtra. According to qualitative analysis, all five honey bee samples were multifloral. Pollen analysis of honey samples, 29 different plants have been determined. The plants contributing nectar and pollens to honey samples in different areas of Bhandara district were found as follows; Fabaceae: *Pongamia*, *Trifolium*, *Butea*, *Dalbergia*, *Tamarindus*; Asteraceae: *Calendula*, *Tridax*, *Carthamus*, *Helianthus*; Apiaceae: *Daucus*; *Coriandrum*; Anacardiaceae: *Mangifera*; Meliaceae; *Azadirachta*; Mimoseae: *Acacia*; Moringaceae: *Moringa*; Myrtaceae: *Psidium*, *Syzygium*; Sapindaceae: *Sapindus*; Combretaceae: *Terminalia*; Lythraceae: *Woodfordia*; Malvaceae: *Abulmoscus*; Sapotaceae: *Madhuca*; Brassicaceae: *Brassica*; Rutaceae: *Citrus*; Poaceae: *Oryza*; The pollen spectra of the samples were indicated various plant species, visiting by honey bees in the area which reflect the vegetation type in the geographical area of Bhandara district. Other important taxa as sources of nectar by honey bees were also identified and listed. The numerous pollen types and their diversity showed that bees travel considerable distance collecting nectar and pollen for honey production.

**Key words:** honey, pollen diversity, pollen analysis, *Apis cerana indica*

### Introduction:

Bee forage includes nectar and pollen nectar is the basic raw material from which honey bees make honey, whereas pollen rich in amino acids, carbohydrates, vitamins and hormones as an essential ingredient for bee nutrition and development of the brood and is therefore essential for the maintenance of a healthy bee colony.

Pollen analysis of honey and bee collected pollen loads for their pollen content provide valuable information regarding plant preferred by the bees for nectar / pollen or both nectar and pollen. It further reflects upon the characteristic local flora and vegetational assemblage of the area studied. It also furnishes information on major and minor sources of nectar and pollen and helps in identifying area with possibilities of having for commercial honey production.

The present research work made on honey bee pollen loads of Pauni, Lakhandur, Lakhani, Adyal, Sakoli areas of Bhandara district of Maharashtra. The region is potentially covered with medium sized trees and shrubs which constitute the woody component of the forest. They includes *Tectona grandis*, *Madhuca indica*, *Terminalia sp.*, *Mangifera indica*, *Acacia nilotica*, *Pongamia pinnata*, *Syzygium cumini*, etc. are widely distributed along the agriculture tracks. The major cultivated crops and vegetables are *Oryza sativa*, *Helianthus annuus*, *Pisum sativum*, *Daucus carota*, *Lycopersicum sp.*, *Brassica sp.* considerably grown in this regions. The area is also covered with several weeds and grasses.





## Material and Methods:

In the present melittopalynological study, five samples of honey bee were collected during the summer season from different location of Bhandara district. All honey samples were collected from the natural *Apis cerena indica* hives. Honey combs were squeezed to remove the honey and only the honey storage portion of comb was used. 50 to 100 gm of honey was collected from each hive and brought in the laboratory for the pollen analysis. The acetolysis method adopted by Erdtman (1960) was used for this study. After centrifugation, the supernatant liquid was decanted off. The pollen sediments was taken on a pallet of glycerin jelly and transferred to the centre of the slides. After being warmed slightly the melted jelly with pollen sediment was covered by cover slip and sealed it with paraffin wax (Nair, 1960). These slides of pollen observed under the microscope. For the identification of pollen, observations on the phenology of the ground flora, reference pollen slide made, the local flora and monographs of literature of related work. Following are the recommendations of International Commission for Bee Botany (ICBB, 1970), samples with 45% or more pollen of a single type are termed as 'unifloral'. The terminology used for describing pollen morphology is based on that of Erdtman *et al.* (1961) and modified by Nair (1970). For the presentation of frequencies of pollen grains in honey, the system adopted by Louveaux *et al.* (1978) was used. The following terms have been used in estimates of pollen grain frequencies. 'Vary frequent' for pollen grains constituting more than 45% of the total, 'sporadic for grain constituting less than 3% and the following terms used for frequency classes. 'Predominant pollen' (more than 45% of the pollen grain counted), secondary pollen (16-45%), important minor pollen (3-15%), minor pollen (less than 3%).

## Result and Discussion:

Bhandara district of vegetation includes moderate size trees, shrubs and herbs occur in forest with agricultural tracks. In melittopalynological studies, five honey samples collected during honey flow period May to June 2012. The colour of the honey sample is light amber. On the basis of frequency distribution of pollen type in honey, all five samples are multifloral. There are twenty nine plant species of different families shows their appearance in the collected honey samples of *Apis cerena indica*. The illustrate plant species in Table – 1 regarded as a source of nectar and pollen to honey bee in the summer period of this regions.

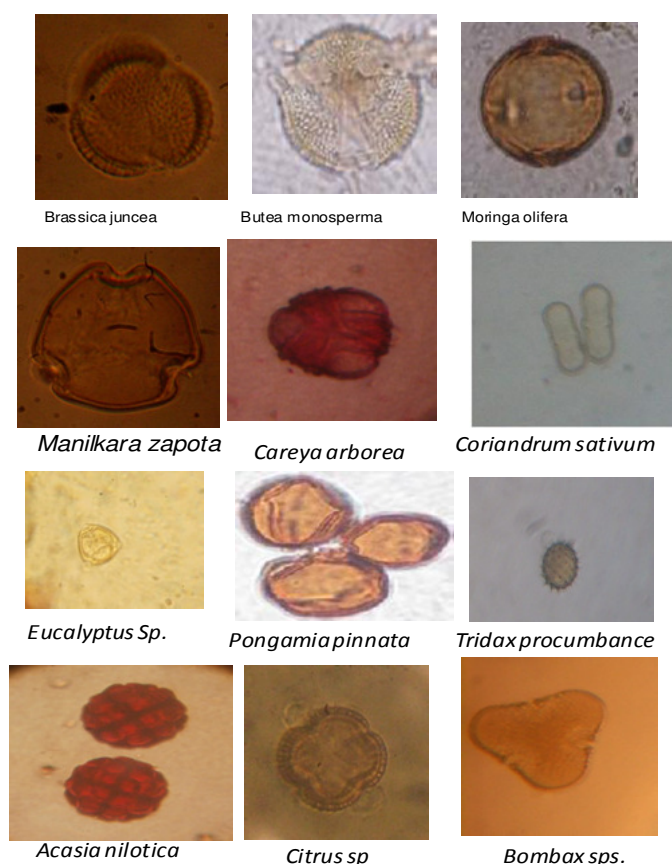
**Table-1:** Frequency distribution of pollen type in summer honey of *Apis cerena indica* collected from different areas of Bhandara district.

S.N.	Plant Species	Pauni (Gaydongari)	Lakhandur (Virli)	Lakhani (Palandur)	Adyal (Pahela)	Sakoli (Jambhadi)
1	<i>Mangifera indica</i>	4.83	5.69	2.24	3.1	4.22
2	<i>Coriandrum sativum</i>	----	3.45	3.15	1.27	3.45
3	<i>Daucus carota</i>	----	2.46	2.45	-	-
4	<i>Calendula arvensis</i>	3.46	3.46	2.6	2.4	-
5	<i>Pongamia pinnata</i>	6.85	6.87	4.85	4.64	5.48
6	<i>Butea monosperma</i>	----	3.05	----	2.28	3.06
7	<i>Azadirachta indica</i>	5.82	6.54	3.84	7.23	3.24





8	<i>Acacia nilotica</i>	4.05	4.62	3.67	3.05	3.46
9	<i>Dalbergia sisoo</i>	4.8	3.28	3.96	4.85	3.48
10	<i>Moringa olifera</i>	4.5-	4.6	6.85	4.75	4.48
11	<i>Psidium guajava</i>	5.6	3.64	3.72	2.69	3.94
12	<i>Sapindus detergens</i>	3.63	5.69	2.54	3.64	3.41
13	<i>Tamarindus indica</i>	3.45	2.67	3.46	3.38	3.48
14	<i>Syzygium cumini</i>	5.87	2.89	3.84	3.45	5.67
15	<i>Terminalia arjuna</i>	2.54	3.42	3.47	2.5	3.49
16	<i>Terminalia tomentosa</i>	4.85	---	3.61	4.25	3.57
17	<i>Terminalia chebulla</i>	2.87	---	2.54	3.67	3.41
18	<i>Terminalia bellarica</i>	4.65	---	2.87	3.49	-
19	<i>Wodfordia floribunda</i>	3.54	3.5	3.15	3.57	2.87
20	<i>Abelmoscus sp.</i>	6.52	2.82	3.64	-	5.61
21	<i>Madhuca indica</i>	3.52	4.3	6.83	7.89	5.69
22	<i>Brassica sp.</i>	4.53	3.55	4.61	3.59	5.62
23	<i>Trifolium sp.</i>	-	4.5	3.56	3.67	-
24	<i>Citrus sp.</i>	3.23	-	-	2.59	4.23
25	<i>Carthmus tinctorias</i>	3.23	3.3	-	3.45	3.74
26	<i>Helianthus annus</i>	3.57	3.6	-	2.61	4.55
27	<i>Oryza sativa</i>	---	3.4	4.69	2.85	2.82
28	<i>Lycopersicon esculentus</i>	3.65	3.2	4.65	3.69	2.49
29	<i>Tridax procumbance</i>	2.54	4.5	4.52	3.45	4.54



**Figure. 1**





After the analysis of pollen load, the appearances of plant species that are Fabaceae: *Pongamia*, *Trifolium*, *Butea*, *Dalbergia*, *Tamarindus*; Asteraceae: *Calendula*, *Tridax*, *Carthamus*, *Helianthus*; Apiaceae: *Daucus*; *Coriandrum*; Anacardiaceae: *Mangifera*; Meliaceae; *Azadirachta*; Mimoseae: *Acacia*; Moringaceae: *Moringa*; Myrtaceae: *Psidium*, *Syzygium*; Sapindaceae: *Sapindus*; Combretaceae: *Terminalia*; Lytheraceae: *Woodfordia*; Malvaceae: *Abulmoscus*; Sapotaceae: *Madhuca*; Brassicaceae: *Brassica*; Rutaceae: *Citrus*; Poaceae: *Oryza*; representing the main major pollen source for *Apis cerena indica* in the region of Bhandara district.

The region of investigation is mainly tropical where the flowering plants trees, shrubs and herbs are profusely distributed along with agricultural fields. The region selected for investigation has good potential for sustaining beekeeping venture because of nectar and pollen. The honey obtained during summer period is of high quality and has high commercial potential as earlier reported by Deodikar (1980). The high dominance of anemophilous pollen of Poaceae constituting one of the major promising bee pasture is of special significance reflecting the behavioral character of the honey bees in frequenting nectar less anemophilous flowers for foraging on pollen exclusively, as also reported earlier (Sharma, 1970; Chaturvedi, 1976). Significant work has been reported by Sen and Baberjee (1956), Phadke (1962,1967), and Seethalakshmi (1983). Latter, pollen loads were analyzed on the basis of pollen morphological characters by Garg and Nair (1994a), Bhusari *et al.* (2005), Attri (2010). These workers have listed important bee forage plants of different regions in India.

## References:

- Attri, P.K. 2010.** Melissopalynological studies of *Apis cerena* summer honey from Chamba district of the Himachal Pradesh. Asian J. Exp. Biol. Sci. 1(4): 930-939.
- Bhusari, N.V., Mate, D.M. and Makde, K.H. 2005.** Pollen of *Apis* honey from Maharashtra. Grana 44: 216-224.
- Chaturvedi, M. 1976.** Pollen analysis of honey bee loads from Banthra, Lucknow, India. New Botanist 3: 90-94.
- Deodikar, G.B.1980.** Apiculture in India; Present and Future. Khadi Gramodyog 26: 340-347.
- Erdtman, G. 1960.** The acetolysis method. A revised description. Sv. Bot. Tidskr, 54: 561-564.
- Erdtman, G., B. Berglund and J. Praglowski. 1961.** An introduction to a Scandinavian pollen flora. Grana Palynologica. 2(3): 3-92.
- Garg, A. and P.K.K. Nair. 1994a.** Honey bee pollen load as a bioindicator of bee pasturage in Bhimtal area of Western Himalayas, India. J. Palynology. 29: 87-109.
- International Comission for Bee Botany(ICBB). 1970.** Methods of melissopalynology. Bee World. 51: 125-138.
- Louveaux,J., Maurizio,A. and Vorwohl,G. 1978.** Methods of melissopalynology. Bee World 59: 139-157.





**Nair, P.K.K. 1970.** Pollen morphology of Angiosperms. A Historical and Phylogenetic Study Scholar Publ. Delhi/ Barnes and Nobles, N. York. pp. 1-160.

**Phadke, R.P. 1962.** Physicochemical composition of major unifloral honey from Mahabaleshwar (Western Ghats). Ind. Bee J.24: 59-65.

**Phadke, R.P. 1967.** Studies on Indian Honey. Proximate composition and physic-chemical characteristics of Indian multifloral apiary honey from *Apis indica* bees. Ind. Bee J. 29: 14-26.

**Sharma, M. 1970.** Studies on the pollen loads of honey bees from Kangra, India. J. Palynol (India) 6: 104-110.

**Sen, J. and Banerjee, D. 1956.** A pollen analysis of Indian honey. Bee World 37: 52-54.  
Seethalakshmi, T.S. 1983. Melittopalynological investigations on some Indian honeys. In: Proc 2<sup>nd</sup> Int. conf. Apic. Trop. Climates, New Delhi1980 (ed.Org. Comm.). pp. 609-621. IARI, New Delhi.

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