

Melittopalynological Studies on *Apis dorsata* Honey Samples Collected During Summer Season in Bhiwapur Tahsil of Nagpur District, Maharashtra State

D. M. Mate

Department of Botany, Nutan Adarsha Arts, Commerce and
Smt. Maniben Harilal Wegad Science College Umrer,
District- Nagpur, Maharashtra State (India) 441203
drdmate@gmail.com

Abstract:

Studies on pollen analysis of Apis dorsata honey were undertaken during summer season in Bhiwapur area of Nagpur District in Maharashtra. A total of five Apis dorsata honey samples were collected. A Total of 19 plant species served as pollen and nectar sources to Apis dorsata honey bees. The chief nectar and pollen sources consisted of Syzygium cumini (Linn.) Skeels. and Helianthus annuus Linn. The study reveals that this region has potentiality for bee keeping and therefore the knowledge of the floral wealth of this region is important for its maximum exploitation.

Keywords: Bee forage, *Apis dorsata*, Bhiwapur tahasil, Nagpur District.

Introduction:

The analysis of pollen in honey is important for identifying the geographical and botanical origin of honeys and also about contamination of honey with brood, dust etc. (Louveaux, *et al.*, 1978). Pollen the male reproductive organ of plants are providing proteinaceous food containing fats, minerals, vitamins essential oils and colouring materials while nectar forms the carbohydrate source having sucrose, fructose and glucose in varying proportions, essential oils minerals and other materials in traces (Rakesh Kumar and Chaudhary, 1993).

Laboratory studies using melittopalynological methods have been made to evaluate sources of pollen and nectar for honey bees in different parts of the country namely Maharashtra (Thakar *et al.*, 1962, Bhusari *et al.*, 2005, Mate D. M. 2013, Borkar Laxmikant and Mate Devendra., 2014), Bihar (Suryanarayana *et al.*, 1992, Rakesh Kumar and Chaudhary, 1994), Andhra Pradesh (Jhansi *et al.*, 1990, Ramanujam C. G. K. and Khatija Fatima 1992, 1993), (Chaturvedi ; 1973, 1977) from Banthra, Uttar Pradesh.

This study is therefore aimed at identifying the pollen and nectar sources to the honey bees *Apis dorsata* Fabr. In Bhiwapur tahsil of Nagpur District, Maharashtra and the knowledge of the floral wealth of this region is very important for its maximum exploration.

Material and Methods:

Five honey samples from *Apis dorsata* honey combs were collected during summer season from five localities of Bhiwapur tahsil of Nagpur District Maharashtra namely Kawadsi (Barad), Shivapur, Pahami, Dhaparla & Kargaon. The colonies of *Apis dorsata* were disturbed by using spray and smoker to calm bees. Once bees leave the comb and fly around it, the honey contained comb is collected quickly.

1 ml honey was mixed with 10 ml distilled water and centrifused. The recovered sediment was treated with 5 ml glacial acetic acid and the mixture was subjected to actolysis (Erdman; 1960) method. Three pollen slides were prepared from each honey sample. The pollen were identified with help of reference slides and relevant literature.



For determining the frequency classes of pollen types, 300 pollen grains were counted (100 per slide) as recommended by the International Commission for Bee Botany (Louveaux *et al*; 1978). Four frequency classes were recognized.

Predominant pollen type	(> 45%)
Secondary pollen type	(16-45 %)
Important minor pollen type	(3-15 %)
Minor pollen type	(< 3%)

Result and Discussion:

From the results it is evident that a total number of 19 species served as pollen and nectar sources to *Apis dorsata* Fabr. (Table – 2). A total number of five samples were collected from Bhiwapur tahasil of Nagpur District in Maharashtra. Sample NGP- BH –Pah-56 from Pahami area had the maximum number of pollen types (14) whereas samples NGP-BH- Kaw (Bar) -53 and NGP-BH-Kar-61 from Kawadsi (Barad) & Kargaon areas had minimum number (11 each) of pollen types of the five honey samples collected from Bhiwapur tahsil (53, 55, 56, 57 & 61) two were found to be unifloral (53 & 57) and other multifloral (55, 56 & 61) (Table- 2). *Syzygium cumini* (47.13 %) formed the predominant pollen type in the sample 53 and *Helianthus annuus* (54.70 %) in the sample 57. *Mangifera indica* and *Sonchus oleraceus* formed the secondary pollen type in the samples 53 and 57 respectively. In the multifloral honeys, *Helianthus annuus*, *Prosopis juliflora*, *Sonchus oleraceus*, *Casearia elliptica*, *Mangifera indica* and *Syzygium cumini* constituted the secondary pollen types. The other significant pollen types (upto important minor) recorded were viz., *Prosopis juliflora*, *Helianthus annuus*, *Sonchus oleraceus*, *Syzygium cumini*, *Azadirachta indica*, *Casearia elliptica*, *Careya arborea*, *Albizia lebbek* and *Terminalia* sp.

Typha angustata and *Sorghum vulgare* were the pollen of non-melliferous / anemophilous taxa encountered in minor percentages. In the samples 53, 55, and 61, however, the pollen of *Typha angustata* were found to be in good numbers (5.83 – 14.84 %).

A total of 19 pollen types (17 melliferous and 2 non-melliferous/ anemophilous taxa) referable to 15 families were recorded from Bhiwapur honeys. The sample 56 had the maximum number of pollen types (14) and the samples 53 and 61, the minimum number (11 each).

The pollen analysis revealed that *Syzygium cumini* and *Helianthus annuus* are the chief nectar and pollen sources and *Mangifera indica*, *Sonchus oleraceus*, *Prosopis juliflora* and *Casearia elliptica* the secondary pollen and nectar sources Bhiwapur area of Nagpur District during summer season.

Table.1- Details of collected honey samples

Sr. No.	Sample No.	Date of collection	Probable sources
1	NGP-BH-Kaw (Bar)	2-4-2010	<i>Syzygium cumini</i> , <i>Mangifera indica</i> , <i>Prosopis juliflora</i> , <i>Helianthus annuus</i> , <i>Sonchus oleraceus</i> , <i>Careya arborea</i> , <i>Blumea</i> sp., <i>Clerodendrum</i> sp., <i>Bombax ceiba</i> , <i>Azadirachta indica</i> , <i>Typha angustata</i>
2	NGP-BH-Shi-55	8-4-2010	<i>Prosopis juliflora</i> , <i>Helianthus annuus</i> , <i>Syzygium cumini</i> , <i>Azadirachta indica</i> , <i>Sonchus oleraceus</i> , <i>Clerodendrum</i> sp., <i>Careya arborea</i> , <i>Albizia lebbek</i> , <i>Terminalia</i> sp., <i>Bombax ceiba</i> , <i>Alangium salvifolium</i> , <i>Blumea</i> sp., <i>Typha angustata</i>
3	NGP-BH-Pah-56	9-4-2010	<i>Helianthus annuus</i> , <i>Sonchus oleraceus</i> , <i>Casearia elliptica</i> , <i>Azadirachta indica</i> , <i>Prosopis juliflora</i> , <i>Careya arborea</i> , <i>Terminalia</i> sp., <i>Clerodendrum</i> sp., <i>Syzygium cumini</i> , <i>Mangifera indica</i> , <i>Allium cepa</i> , <i>Albizia lebbek</i> , <i>Alangium salvifolium</i> , <i>Typha angustata</i>
4	NGP-BH-Dha-57	10-4-2010	<i>Helianthus annuus</i> , <i>Sonchus oleraceus</i> , <i>Casearia elliptica</i> , <i>Careya arborea</i> , <i>Albizia lebbek</i> , <i>Azadirachta indica</i> , <i>Terminalia</i> sp., <i>Clerodendrum</i> sp., <i>Blumea</i> sp., <i>Prosopis juliflora</i> , <i>Alangium salvifolium</i> , <i>Sorghum vulgare</i>
5	NGP-BH-Kar-61	15-4-2010	<i>Mangifera indica</i> , <i>Syzygium cumini</i> , <i>Helianthus annuus</i> , <i>Prosopis juliflora</i> , <i>Sonchus oleraceus</i> , <i>Careya arborea</i> , <i>Clerodendrum</i> sp., <i>Echinops echinatus</i> , <i>Albizia lebbek</i> , <i>Abutilon indicum</i> , <i>Typha angustata</i>

Table. 2- Frequency (%) Distribution of Pollen Types in the Honey Samples

Sr. No.	Species	NGP-BH-Kaw (Bar)-53 (Unifloral)	NGP-BH-Shi-55 (Multifloral)	NGP-BH-Pah-56 (Multifloral)	NGP-BH-Dha-57 (Unifloral)	NGP-BH-Kar-61 (Multifloral)
1	<i>Abutilon indicum</i> P.Miller.	-	-	-	-	0.08
2	<i>Alangium salvifolium</i> (Linn. f.) Wanger.	-	0.09	0.43	0.16	-
3	<i>Albizia lebbek</i> (Linn.) Benth.	-	0.37	0.98	3.86	0.08
4	<i>Allium cepa</i> Linn.	-	-	1.09	-	-
5	<i>Azadirachta indica</i> A. Juss.	0.11	3.90	11.40	3.69	-
6	<i>Blumea</i> sp.	0.66	0.09	-	0.84	-
7	<i>Bombax ceiba</i> Linn.	0.11	0.27	-	-	-
8	<i>Careya arborea</i> Roxb.	0.88	0.74	2.74	3.94	0.70
9	<i>Casearia elliptica</i> Willd.	-	-	16.11	11.17	-
10	<i>Clerodendrum</i> sp.	0.33	1.11	1.53	1.26	0.26
11	<i>Echinops echinatus</i> Roxb.	-	-	-	-	0.08
12	<i>Helianthus annuus</i> Linn.	8.49	36.55	40.13	54.70	14.15
13	<i>Mangifera indica</i> Linn.	21.52	-	1.20	-	38.05
14	<i>Prosopis juliflora</i> (Sw.) Dc.	15	41.95	2.74	0.67	11.68
15	<i>Sonchus oleraceus</i> Linn.	5.29	3.27	18.20	16.55	4.42
16	<i>Terminalia</i> sp.	-	0.27	1.97	3.10	-
17	<i>Syzygium cumini</i> (Linn.) Skeels.	47.13	6.60	1.42	-	30.44
18	<i>Sorghum vulgare</i> Pers. (Non-melliferous)	-	-	-	0.83	-
19	<i>Typha angustata</i> Bory. et. Chaub.	14.84	10.41	0.97	-	5.83

Conclusion:

The microscopic analysis of honey samples collected from Bhiwapur tahsil during summer season in Nagpur District shows that the area is rich in variety of wild and cultivated plants. *Helianthus annuus*, *Allium cepa* and *Sorghum vulgare* are the cultivated crop plants of this area. Of these *Helianthus annuus* is main predominant nectar and pollen source to *Apis dorsata* honey bees in this region. Similarly *Syzygium cumini* a wild plant is also the main predominant nectar and pollen source to the honey bees. The other remaining wild plants viz., *Alangium salvifolium*, *Albizia lebbek*, *Azadirachta indica*, *Blumea* sp., *Careya arborea*, *Casearia elliptica*, *Clerodendrum* sp., *Prosopis juliflora*, *Sonchus oleraceus* and *Terminalia* sp. are the secondary & reliable pollen and nectar sources to *Apis dorsata* honey bees.

This study will be helpful to beekeepers for identifying the pollen and nectar sources to honey bees during summer season in Bhiwapur tahsil of Nagpur District and is also important for its maximum exploitation.

Acknowledgements:

The author is grateful to late prof. C.G.K. Ramanujam for suggestions and his personal interest.

References:

Bhusari, N.V. Mate D.M. and Makde K.H. 2005. Pollen of *Apis* honey from Maharashtra. *Grana* 44 : 216-224

Borkar Laxmikant and Mate Devendra 2014. Melittopalynological Investigation of winter honeys collected from *Apis dorsata* hives of Multahsil of Chandrapur District of Maharashtra State (India). *Int. J. of Science and Engineering*. Vol. 2 (3) : 112-118

Borkar Laxmikant and Mate Devendra 2014. Summer pollen sources to *Apis dorsata* honey bees from Bramhapuri forest area of Chandrapur District of Maharashtra State (India) *Int. J. of Life Sciences*. Vol. 2 (2) : 160-164



- Chaturvedi M. 1973.** Analysis of honey pollen loads from Banthra, Lucknow, India. *Grana* 13 : 139-144
- Chaturvedi M. 1977.** Further investigation on the pollen analysis of bee loads from Banthra, Lucknow, India. *New Bot.* 4 : 41-47
- Erdtman G. 1960.** The acetolysis methods. A revised description. *Sevensk Bot, Tidskr.* 54:561-564
- Jhansi P., Kalpana T.P. and Ramanujam C.G.K. 1990.** Pollen analysis of Rock bee summer honey from Prakasam district of Andhra Pradesh, India. *Journal of Apicultural Research.* 29 (4) : 199-205
- Louveaux Maurizo Anna and Vorwohl G. 1978** Methods of Melissopalynology. *Bee world* 59 : 139-157
- Mate D. M. 2013.** Pollen analysis of squeezed honeys from Umrer Tahsil of Nagpur District Maharashtra State, (India) and its relevance to apiculture. *International Journal of Biosciences, Agriculture and Technology.* Vol. 1 : 163-173
- Rakesh Kumar and Chaudhary O.P. 1993.** Bee plants in India. *Khadi Gramodyog* Vol. XXXIX (11 and 12): 844-854
- Rakesh Kumar and Chaudhary O.P. 1994.** Bee flora of Muzaffarpur, Bihar (India). *Indian Bee Journal.* 56 : 53-63
- Ramanujam C. G. K. and Khatija Fatima 1992.** Summer pollen sources to *Apis dorsata* honey bee in deciduous forest of Mahaboobnagar District, Andhra Pradesh. *Geophytology.* 21 : 155-161
- Ramanujam C. G. K. and Khatija Fatima. 1993.** Pollen analysis of squeezed honey of *Apis dorsata* from the deciduous forest of Achampet Taluk, Mahaboobnagar District, Andhra Pradesh. *Journal of Palynology.* 29 : 41 – 52
- Thakar C. V., Diwan V.V. and Salvi S.R. 1962.** Floral calendar of major and minor bee-forage plants in Maharashtra hills (Western Ghats). *Indian Bee Journal.* 24 : 33-48.
-

