RESEARCH ARTICLE

Summer Pollen Sources to *Apis dorsata* honey bees collected from Bramhapuri forest area of Chandrapur District of Maharashtra State (India)

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ABSTRACT

33 pollen loads recovered directly from the honey combs of *Apis dorsata* (Rock Bee) collected in May 2013 from Ganeshpur forest area of Bramhapuri Tahsil of Chandrapur District of Maharashtra State, were analysed. Two (6.6%) pollen loads were found to be Uniforal, nine (27.27%) biforal and twenty-two (66.66%) multfloral. The Unifloral pollen loads were contained *Terminalia* sp. The pollen of *Terminalia* sp were recovered from 31 (93.93%) of the total pollen loads studied. The study high lights *Terminalia* sp (combretrceace) do the major pollen source and *Mangifera indica* (Anacardeaceae),, *Blumea* sp (Asteraceae), *Citrus* sp (Rutaceae) and *Delonix regia* (Caesalpineaceae) as fairly important sources of pollen of the honey bees during the summer period.

Keywords – Pollen Sources, Honey Bee, Bramhapuri Tahsil. forest area.

INTRODUCTION

Honey bees visit plants for nectar and pollen. Nectar consisting predominantly of sources often associated with limited quantity of glucose and pollen grains provide the chief source of protein requirement of the bees essential for building their body tissues. (Khan, 1941) particularly during the early embryonic growth, bees prefer the nectar of a plant species that has the maximum sugar concentration. (Ramanujam, 1991). Similarly they prefer pollen type with the maximum nutritive values and palatability. Melittopalynological investigation involving honey samples and pollen loads furnish reliable information on the relative preferences of the honey bees among the floral sources available within their foraging ranges. (Ramanujam, 1994) Analysis of pollen load unravels the floral fidelity of fixity of the bees to a particular plant species in any floristic community, by highlighting the numerical status of the pollen type in the individual loads. The

quantification of the data would help us to recognize the major and minor sources of pollen in any particular area. (Chaudhari 1978)

Studies involving the analysis of pollen loads are few when compared to those of honeys, in the Indian context. Sharma (1970a; 1970b; 1972) and Chaturvedi (1973) studied the pollen loads of *Apis cerena*, the Indian hive bee, from Kangra in Himachal Pradesh and Banthara in the vicinity of Luckhnow. Seethalakshmi and Perey (1980) recognized Borassus flabellifer as a good pollen sources in Tamilnadu by analysing 900 pollen loads of *Apis cerena* at Vijayarai in West Godawari District of Andra Pradesh and recognized potential of this region for apiculture Kalpana, Khatija and Ramanujam (1990) and Ramanujam and Kalpana (1990) provided information on the pollen sources of *Apis florea*_ and *Apis cerena* honey bees in Hydrabad and Ranga Reddy District. Recently Cherian *et al.* (2011) provided information on the pollen sources of *Apis cerena* honey bees in Nagpur District of Maharashtra. This study is aimed to recognize the major and minor sources of pollen to *Apis dorsata* bee in these forest during summer period (Honey flow season) on the basis of qualitative and quantitative analysis of numerous pollen loads recovered directly from various honey combs

MATERIALS AND METHODS

Pollen loads (Comb loads) 33 in number of *Apis dorsata* were obtained from One Honey combs collected on 5th May 2013 from Ganeshpur forest area of Bramhapuri tahsil of Chandrapur District of Maharashtra State. (CHN – BRA - GAN). The pollen grains of each pollen load were dispersed in 1 ml of glacial acetic Acid and later on subjected to acetolysis. Erdtman (1960) One slide prepared for each pollen load and microscopically examined. All such pollen loads consisting of a single pollen type represent unifloral loads, with two pollen types bifloral and with more than two, multifloral Sharma, (1970 a). Identification of the pollen types was based upon the reference palynoslides of the forest flora and the relevant literature. The pollen productivity of the significant taxa was computed using haemocytometer.

RESULTS AND DISCUSSION

The analysis has brought to light that two (6.06%) loads were unifloral, nine (27.27%) were bifloral and the remaining twenty two (66.66%) loads multifloral (Table 2).

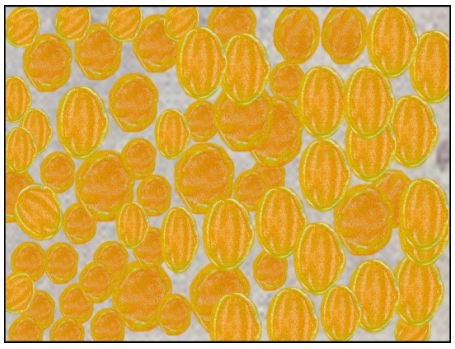
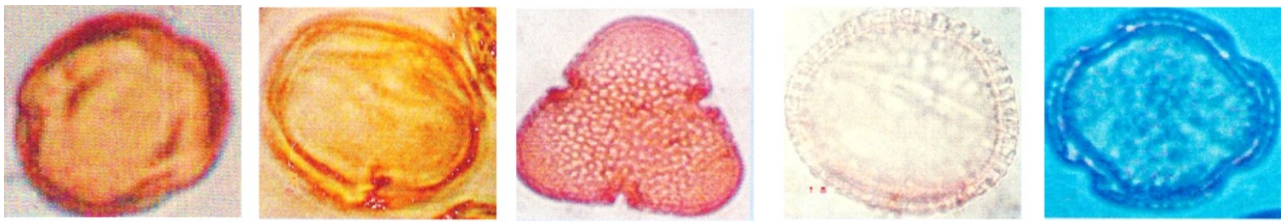
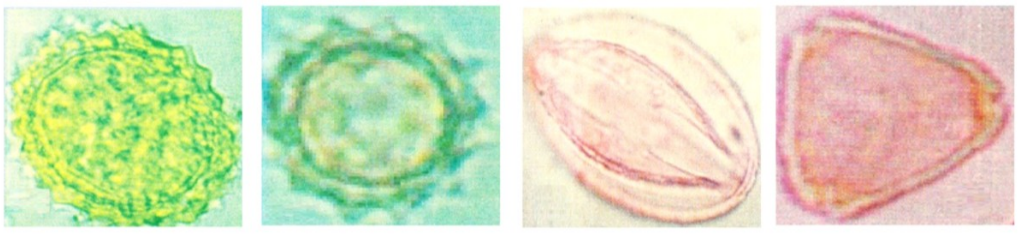


Fig. 1 – Pollen types in unifloral Pollen Loads



1 *Capparis grandis* 2. *Mangifera indica* 3. *Bombax ceiba* 4. *Delonix regia* *5. Citrus* sp



6. *Carthamus tinctorius* 7. *Blumea* sp. 8. *Prosopis juliflora* 9. *Pisidium guajava*

Fig. 2 (1-9): Light Microscopic photograph of pollen grain in pollen loads

Table 1: Pollen morphological characters of the Taxa recorded

S.N.	Pollen Type	Size, Shape & Symmetry	Aperture Pattern	Pollen Wall (sporoderm) structure & sculpture
Asteraceace				
01	*Blumea* sp.	21-24 µm, Amb spheroidal, isopolar, Radially symmetrical	Tricolprate, colpi long	Exine 3 µm thick, surface echinate, spines 5-6 µm long, 4 spines in the inter apertural region interspinal area psilate
02	*Carthamus tinctorius* Linn.	59-65 µm, Amb spheroidal: 58-62× 66-73 µm, subprolate, radially symmetrical	Tricolporate , colpi with tapering ends, ora lalongate	Exine (spinoid processes included) about 8 µm thick at poles, 10 µm at equator tectate, tectum prominently columellate, columella simple or branched, sharply undulating with supratectal solid, pointed, robust sinule like processes
Anacardeaceae				
03	*Mangifera indica* Linn.	27-31 µm, Amb subtriangular; 29-32 ×26-28 µm , subprolate; Radially symmetrical	Tricolporate colpi long, tips acute ora prominently lanlongate	Exine 2.5 µm thick, subtectate, surface striatoreticulae, striations more or less parallel in equatorial view, lumen generally elongated in polar direction, murisimplibaculate
Bombaceae				
04	*Bombax ceiba* Linn	51 µm (49.5×52.5) µm, peroblate, isopolar, Radially symmetrical	Tricolprate, col. length 12 (10.5-13.5) µm	Exine thick 3 µm, coarsely reticulate, mesh 4.1 µm (3-4.5 µm) in the major part except at the angles showing medium reticulations 1-8 µm (1.5 -3 µm), greater number of baculae are found in the lumen. Muri simplibaculate, faint LO pattern.
Caesalpiniaceae				
05	*Delonix regia* (Boj. ex. Hoof.) Ref.	59.62 µm, Amb more or less spheroidal to subtriangular; 53-56× 57-60 µm, oblate to suboblate; Radially symmetrical	Tricolporate, colpi long with blunt ends, ora faint, more or less rounded	Exine 5.2 µm thick, subtectate, surface coarsely reticulate. Heterobrochate, meshes smaller near the apertural regions & larger elsewhere , lumina poly to hexagonal with a number of free bacules, muri thick, sinuous, simpli to locally duplibaculate
Capparidaceace				
06	*Capparis grandis* Linn.	10-12 µm , Amb spheroidal; 14-16 ×9-12 µm prolate to subprolate; Radially symmetrical	Tricolporate, colpi linear to narrowly elliptic, ends tapering, tips acute, ora faint lalongate	Exine 1 µm thick, tectate, surface faintly granular to almost psilate
Combratrceace				
07	*Terminalia* sp.	19-22 µm, Amb spheroidal; 21-24 x20-22 µm, subprolate; Radially symmetrical	Tricolporate, colpi alternating with pseudocolpi colpi linear, tips acute pseudocolpi almost equal the size of colpi, ora more of less circular	Exine 1.5 µm thick, tectae, surface psilate to locally finely granular
Mimosaceae				
08	*Prosopis juliflora* (Sw.) DC	36-39 µm, Amb rounded triangular; 38-42× 30-35 µm, prolate to subprolate; Radially symmetrical	Tricolllporate, occasionally syncolpate, colpi tapering towards poles, tips acute, ora lalongate	Exine 3.2 µm thick, tectate surface faintly reticulate
Myrtaceae				
09	*Pisidium guajava* Linn.	24-25 µm, Amb subtriangular; 13-16× 26-28 µm, oblate; Radially symmetrical	Tricolporate, syncolpate, parasyncolpate, ora lalongate	Exine 1.5 µm thick , tectate surface granular to pailate

Table 1: Continued…

S.N.	Pollen Type	Size, Shape & Symmetry	Aperture Pattern	Pollen Wall (sporoderm) structure & sculpture
Rutaceae				
10	*Citrus* sp.	27-29 µm, Amb squarish, 26-30 ×25-27 µm, prolate spheroidal radially symmetrical	Tetracolporate, colpi linear, tips acute, ora lalongate	Exine 2 µm thick subtectate, surface Reticulate. Heterobrochate, meshes smaller near the apertural regions and larger elsewhere, lumina hexa to pentagonal or irregular, psilate, muri simpli to locally duplibaculate

Table 2 - Analysis of pollen loads from honey comb

Bramhapuri Tahsil							
Comb	Total Pollen Loads	Unifloral Loads		Bifloral Loads		Multifloral Loads	
		Number	Composition	Number	Composition	Number	Composition
CHN-BRA-Gan	33	02	2 – Te	09	7-Ma(32,85), Te(15,68) 2-Te(12,48), Bl(52,88)	22	9 -Te(9,89), Ma(3,57), Bl(2,84) 7 -Ci(15,32), Te(55,70), Ma(10,15) 3-Car(5), Te(81), De(14) 2 -Te(37,40), Bl(2,5), De(84,88), Ca(10,11), Ma(50,54), Bo(9,10) 1 -Bl(58), Pr(38), Ps(4)
	33	2 (6.06%)		9 (27.27%)		22(66.66%)	

The pollen grains of 10 taxa referable to 09 families were recorded. These are *Terminalia* sp. (Combratrceace), *Mangifera indica* (Anacardeaceae), *Blumea* sp. and *Carthamus tinctorius* (Asteraceace), *Citrus* sp. (Rutaceae), *Delonix regia* (caesalpiniaceae), *Cappnris grandis* (Capparidaceace), *Bombax ceiba* (Bombaceae), *Pisidium guajava* (Myrtaceae), and *Prosopis juliflora* (Mimosaceae). Of these *Blumea* sp. and *Carthamous tinctorius* are three herbaceous weeds which represent the undergrowth, the remaining taxa are either arborescent member or shrub of the forest range.

The unifloral pollen loads include two (6.06%) of *Terminalia* sp. only (Fig. 1), and *bifloral* nine (27.27%) include *Terminalia* sp. & *Mangifera indica*, *Blumea* sp. and *Terminalia* sp in combination.

The multifloral loads which are encountered showed the pollen types of *Terminalia* sp, M*angifera indica*, *Blumea* sp., *Citrus* sp., *Carthamus tinctorius*, *Delonix regia, Capparis grandis, Bombax ceiba, Psidium guajava*, and *Prosopis juliflora* (Fig. 2).

When the representation (Irrespective of percentage) of the various pollen types in the total number of pollen loads studied was considered & the percentages of pollen types recorded in each bifloral and multifloral loads were determined by counting 200 pollen grains at random, (Sharma 1970a) pollen of *Terminalia* sp. were

noted in as many 31 loads (93.93%) followed by *Mangifera indica* in 18 loads (54.54%) .

The analysis showed that the pollen loads obtained from the bee hives of *Apis dorsata* in the Ganeshpur forest area of Bramhapuri Tahsil of Chandrapur District of Maharashtra State, originated predominantly from some of the characteristics arborescent and shrubby plants of this forest area. Viz. *Terminalia* sp, *Mangifera indica*, *Citrus* sp., *Delonix regia, Cappnris grandis, Bombax ceiba, Psidium guajava*, and *Prosopis juliflora*. The contribution to herbaceous weeds such as *Blumea* sp. *Carthamus tinctorius* as pollen source to *Apis dorsata* bees is very meagre.

The quantification of the data revels unequivocally the predominance of the pollen of *Terminalia* sp as evidenced by it's very high representation of 100% in the Unifloral loads and 93.93% in the totality of the pollen loads material studied.

It can therefore be concluded that *Terminalia* sp constitutes the major source of pollen to the honey bees during the summer period. The other fairly significant source of pollen to the honey bees of this area are *Mangifera indica* (57.54), *Citrus* sp (21.21%), *Delonix regia, Blumea* sp (Each 15%).

All these taxa also constitute important pollen source during the summer season for the honey bees of this forest area.

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