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Research Article

Important Winter Bee Plant Of Sonapur Area, Kamrup District, Assam

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ABSTRACT
After Melissoplynological analysis, a total of 50 species belonging to 33 families were identified from 5 honey samples collected during the winter season (Dec-Feb) of 2010-2011 from Sonapur area Kamrup District, Assam. Out of 50 species 7 species belonging to 4 families were included under monocotyledon and others were included under dicotyledon. Two samples were reported as unifloral type.

***Key word*:** Melissopalynology, Honey, Unifloral.

INTRODUCTION
Melissopalynology is an applied branch of palynology. Melissopalynological studies dealing with microscopic analysis of the pollen contents of seasonal honeys and pollen loads from a locality, when supplemented with critical field studies involving phenology and floral biology, provide reliable information regarding the floral types which serve as major and minor nectar and or pollen sources for the honey bees (Attri, 2010).

Analysis of pollen contents of honey is useful in the determination of the geographical and botanical origin of particular type of honey (Stawiarz *et al*., b2010). According to Jones & Bryant (2004) pollen found in honey is used to determine the honey's type. The determination of geographical origin is generally based on the entire pollen spectrum being consistent with the flora of a particular region (Louveaux *et al.*,1978) or the presence of a combination of pollen type of the particular area. Pollen analysis of honey is also of great importance for the quality control and help to ascertain whether honey is adulterated or not (Maurizio, 1951; Molan, 1998; Louveaux *et al*., 1978; Terrab *et al*., 2003).

Sonapur under Dimoria development block of Guwahati sub division is an area of Kamrup District with hill and plain. It is extended between latitude 26˚10□N and longitude 91˚45□ E and its approximate altitude 55 m above MSC. The temperature ranges from 6˚-38˚, average rainfall is 1,600 mm per year and the relative humidity is 76.6%. A tributary Digaru is flowing through heart of the town. The geographical area of Dimoria Development block is 261.64 km² of which an area of 16.58km² is under the forest. . Dominant vegetation of this area is grass , *Cassia* sps., *Derries indica* (Lamk) Bennt, *Tectona grandis* Linn.f., *Samanea saman*(Jacq.) Messil, *Zizyphus mauritiana* Lamk., *Bombax ceiba* Linn., *Bambusa* sp. etc. Some cultivated plants *Acacia* sp., *Caesalpinia pulcherrima* (L). So, *Eucalyptus* Sp. etc are also dominant species of this area. A characteristic feature of this area is swamp and marsh vegetation. Numbers of ponds and swamp areas are present here. These are occupied by *Eichhornia crassipes* Solm., *Nymphoides cristatum* Ktze., *Monochornia hastate* Prest., *Nelumbo nucifera* Linn., and species of *Polygonum* .

The aim of the present study was to determine the pollen spectrum from honey samples and provide some information regarding nectar and pollen sources for beekeepers. The other major aim was to recognize the local vegetation through microscopic analysis of honey.

MATERIAL AND METHODS:
5 honey samples were collected during the winter season (Dec-Feb) of 2010-2011 from five pre-selected bee hives. This season is characterized by foggy morning, clear night with sunny noon. The average temperature fluctuates between 10˚C and 12˚C.

For slide preparation we followed acetolysis method of Erdtmann (1960). We also followed the same method to prepare the reference slides from flowering species to identify the pollen grains isolated from honey and bee pollen loads.

For pollen analysis of the honey samples, the laboratory methods recommended by Louveaux al el. (1970, 1978) were used. Following his procedure we counted 200-300 pollen grains per samples and interpreted in terms of frequency classes. "Predominent pollen" occurs in excess of 45%, "secondary pollen" is between 16-45%, "important minor pollen" falls between 3 and 15% and "minor pollen" that is found below 3%. Using frequency class system, honey samples are named as unifloral

(45%) and mixed floral type.

The frequency distribution was also calculated by using Louveaux (1970, 1978) method. The frequency distribution of a taxon in a series of honey samples is determined by dividing the number of samples in which taxon occurs by the total number of samples. Accordingly taxon is classified as "rare" (less than 10%), "infrequent" (10-20%), "frequent" (20-50%) and "very frequent" (more than 50%).

RESULT AND DISCUSSION

A total of 50 species belonging to 33 families are identified. No's of pollens are unidentified. Out of 33 families and 50 species 4 families and 7 species are included under monocotyledons and others are under dicotyledons. All identified species are presented in TABLE-1 according to Bentham and Hooker(1862-1883) system of classification . Analytical data such as pollen type, samples no, frequency classes and frequency of distribution are presented in TABLE-1 and data are graphically analyzed in Fig-1. Percentage of occurrences is also graphically analyzed in Fig-2.

Sample wise analytical data are discussed below-

Sample 1(S1): The analytical data shows that only *Brassica campestris* Linn is predominant and no's ofa) secondary pollens are 12, important minor pollens are 9 and minor pollens are 6. Altogether 28 species are identified from sample-1. Therefore out of 50 species the percentage of occurrence is 56 and the sample is categorized as unifloral.

Sample 2(S2): From sample 2 we have got 2 predominant pollen types *Brassica campestris* Linn and *Brassica rapa* Linn. Therefore Sample 2 is again categorized as unifloral sample. No's of pollens for other frequency classes such as secondary, important minor, minor are 11, 11 and 5 respectively. Total 31 pollen types are identified, so their percentage of occurrence is 62%.

Sample 3(S3): Predominant species are not reported from this sample and identified pollens are 27 classified as secondary (pollen no's 9), important minor (pollen no's 15) and minor (pollen no's 3). Therefore percentage of occurrence is 54%.

Sample 4(S4): Total 33 pollen types are identified from sample 4, of which 13 pollen are categorized as secondary, 8 pollens are as important minor and 12 pollen are as minor pollen. No predominant pollens are reported from this sample. Therefore this sample is multifloral and percentage of occurrence is 66%.

Sample 5(S5): 32 no's of pollen types are identified and all are classified as secondary (no's of pollen 8), important minor (14 different types) and minor (!0 types). Here also predominant pollen type is not reported and percentage of occurrence is 64%.

After analysis of frequency of distribution from TABLE-1, it is found that 34 species are more frequent (more than 50%), and 16 species are frequent (20-40%).

The pollen count used to derive the percentage frequency of the pollen from the sample showed that some species were more frequent in the samples because

Some plant species readily produces nectar and their flowering period is longer if compared with other species. Some flowering plants may be having good quality of nectar.

This analysis showed that bee collect their nectar of that plants which are available in that area. The field study also support this. During the winter period Brassica campestris Linn. and B. rapa Linn. are extensively cultivated. So two samples are identified as unifloral. This type of data help a beekeeper to know the honey formation from flowering plants. Thus they can take appropriates steps to develop apiculture.

Table 1: Frequency classes and frequency and flowering season of 50 pollen types.

Plant name &family	Flowering season	No. of samples	S1	S2	S3	S4	S5	FD(%)
DICOTYLEDONS								
1. PAPAVERACEAE								
Argemone mexicana L.	Jan-Jun	2	S		M			40
2. BRASSICACEAE								
Brassica campestris Linn.	Jan-Mar	5	D	D	S	S	S	100
Brassica rapa Linn.	Jan-Apr	5	S	D	S	S	S	100

Brassica rugosa prain.	Jan-Apr	4	M	S		S	M	80
Raphanus sativum L.	Jan-Feb	4		S	M	S	S	80
3. CLEOMACEAE								
Cleome viscosa Linn.	Jan-Nov	3		T	M	T		60
4. CLUSIACEAE								
Mesua ferrea Linn.	Feb-May	3	M	M			T	60
5. MALVACEAE								
Hibiscus rosa- sinensis L.	RTY	4		S	S	M	M	80
6. BOMBACACEAE								
Bombax ceiba Linn.	Feb-Apr	4	S	S		M	T	80
7. OXALIDACEAE								
Oxalis sp.		1					M	20
8.AVERRHOACEA								
Averrhoa carambola L.	Sept-Feb	5	S	S	M	S	S	100
9. BALSAMINACEAE								
Impatiens balsamina L.	RTY	3	M		T	T		60
10. MALIACEAE								
Cedrela toona Roxb.	Jan-Apr	2		M		M		40
11. AQUIFOLIACEAE								
Ilex sp.		1					T	20
12. MORINGACEAE								
Moringa oleifera Lamk.	Jan-Apr	4	S	S	M	S		80
13. MIMOSACEAE								
Acacia auriculiformis A.								
Cunn & Benth.	Nov-Mar	2		T		T		40
14. CAESALPINIACEAE								
Bauhinia acuminata Linn.	Nov-Mar	2			M		M	40
Cassia sophera Linn.	July-Feb	4	T	M	S	M		80
15. PAPILONACEAE								
Clitoria ternatea Linn.	RTY	3		T	M		T	60
Desmodium heterophylum DC.	Feb-May	3	S			M	M	60
16. MYRTACEAE								
Callistemon speciosus Linn.	RTY	2	T			T		40
Eucalyptus maculata Hook.	RTY	3		S	S	S	S	60
Var. *citriodora.*								
17. RUBIACEAE								
Anthocephalus chinensis	Dec-July	2	S		S			40
(Lamk) A. Risch ex Walp.								
18. ASTERACEAE								

Azeratum conyzoides Linn.	Sep-Jan	1	T					20
Parthenium hysterophorus Linn.	Jan-Oct	3			M			60
Vernonia sp.	Dec-May	2				T		40
19. APOCYNACEAE								
Plumeria acutifolia Poir.	RTY	3	S		M		M	60
20. CONVOLVULACEAE								
Ipomea cymosa R&S.	Jan-Mar	4	M		T	S	S	80
Ipomea hederacea Jacq.	Jan-Feb	4		M	T	S	M	80
21. SOLANACEAE								
Lycopersicum esculentum Mill.	RTY	2		T		T		40
Datura metel Linn.	Sep-Apr	2	M			T		40
22. ACANTHACEAE								
Adhatoda vasica Nees.	Dec-Apr	3	S		S	S		60
Phlogacanthus thyrsiflorus (Roxb.) Nees.	Dec-Feb	2		M			M	40
23. VERBENACEAE								
Tectona grandis L.f.	Jan-July	4		S	S	S	S	80
Lantana camera L.	RTY	1	T					20
Gmelina arbores Roxb.	Mar-Jan	2		M			M	40
24. NYCTAGINACEAE								
Baugainvillaea spectabilis Willd.	Nov-May	3	M	S		T		60
25. AMARANTHACEAE								
Amaranthus Sp.	RTY	3		M		M	T	60
26. CHENOPODIACEAE								
Chenopodium album Linn.	Jan-May	4	S	M	M		M	80
27. BASELLACEAE								
Basella alba L.	Feb-Mar	3		T		T	T	60
28. POLYGONACEAE								
Rumex nepalensis Spreng.	Jan-May	5	M	M	M	M	M	100
Rumex vasicarius L.	Jan-May	5	T	S	M	T	T	100
Polygonum chinensis Linn.	Dec-Mar	3		T	M		T	60
29. EUPHORBIACEAE								
Ricinus communisms L.	RTY	3	S		M		M	60
MONOCOTYDEDONS								
30. ZINZIBERACEAE								
Curcuma aromatica Salish.	Jan-Mar	3		T		T	M	60
Curcuma longa Linn.	Jan-Mar	1	M					20
31. LILIACEAE								
Allium cepa L.	Jan-Mar	5	S	M	M	S	T	100

Allium sativum L.	Jan-Mar	5	M	S	S	T	T	100
32. PONTEDERIACEAE								
Eichornia crassipes (Mart) Solms.	Nov-Apr	3		M		S	S	60
33. ARECACEAE								
Cocos nucifera Linn	RTY	4	T	T		M	M	80

Frequency classes: Values indicate the number of samples in which the different pollen types appeared at the following percentages >45 per cent: Predominant pollen (D); 16-45 per cent: Secondary pollen (S); 3-15per cent: Important Minor pollen (M) ; <3 per cent: Minor(T), FD: Frequency of distribution RTY- round the year.

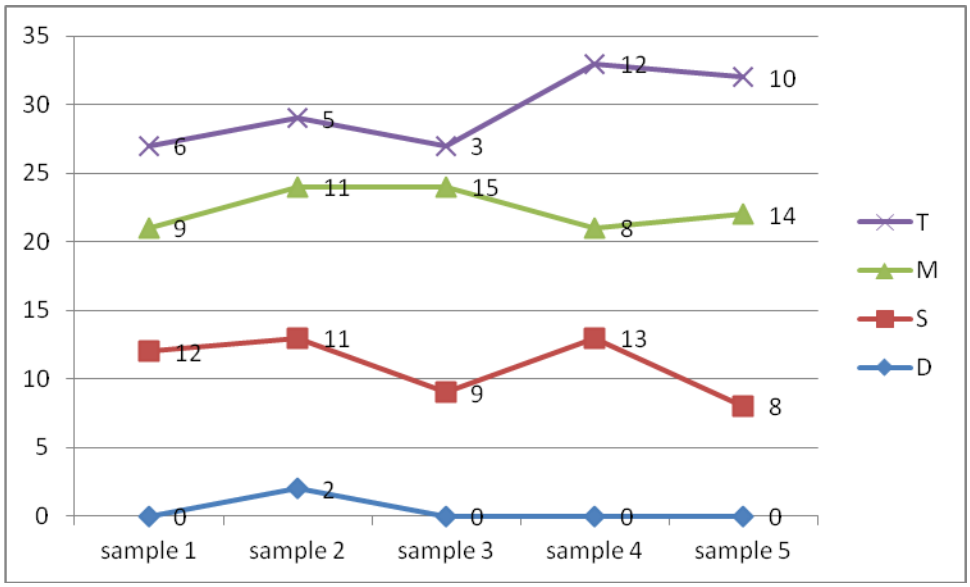

Figure 1: Sample wise frequency classes.

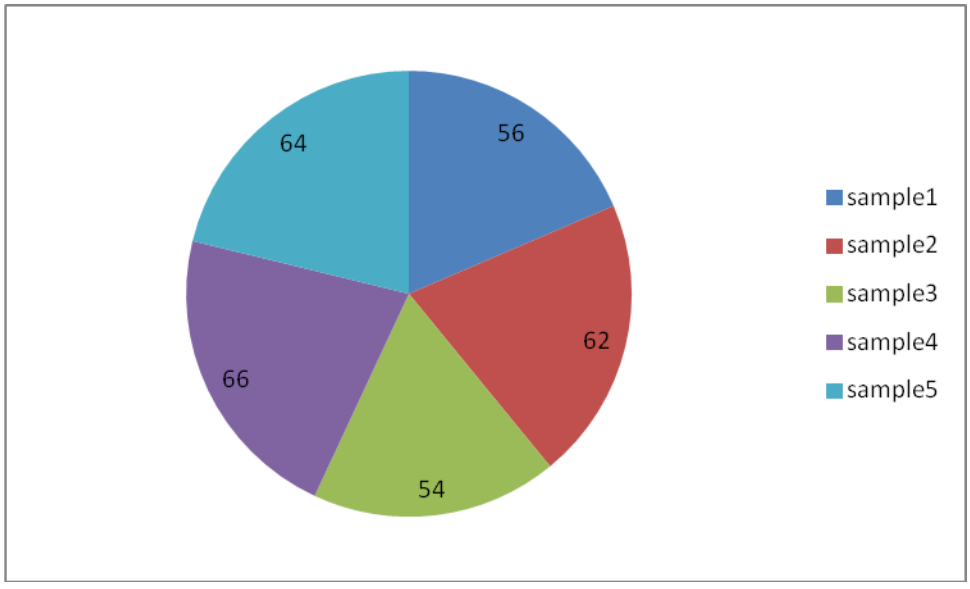

Figure 2: Percentage of occurrences of pollen grains.

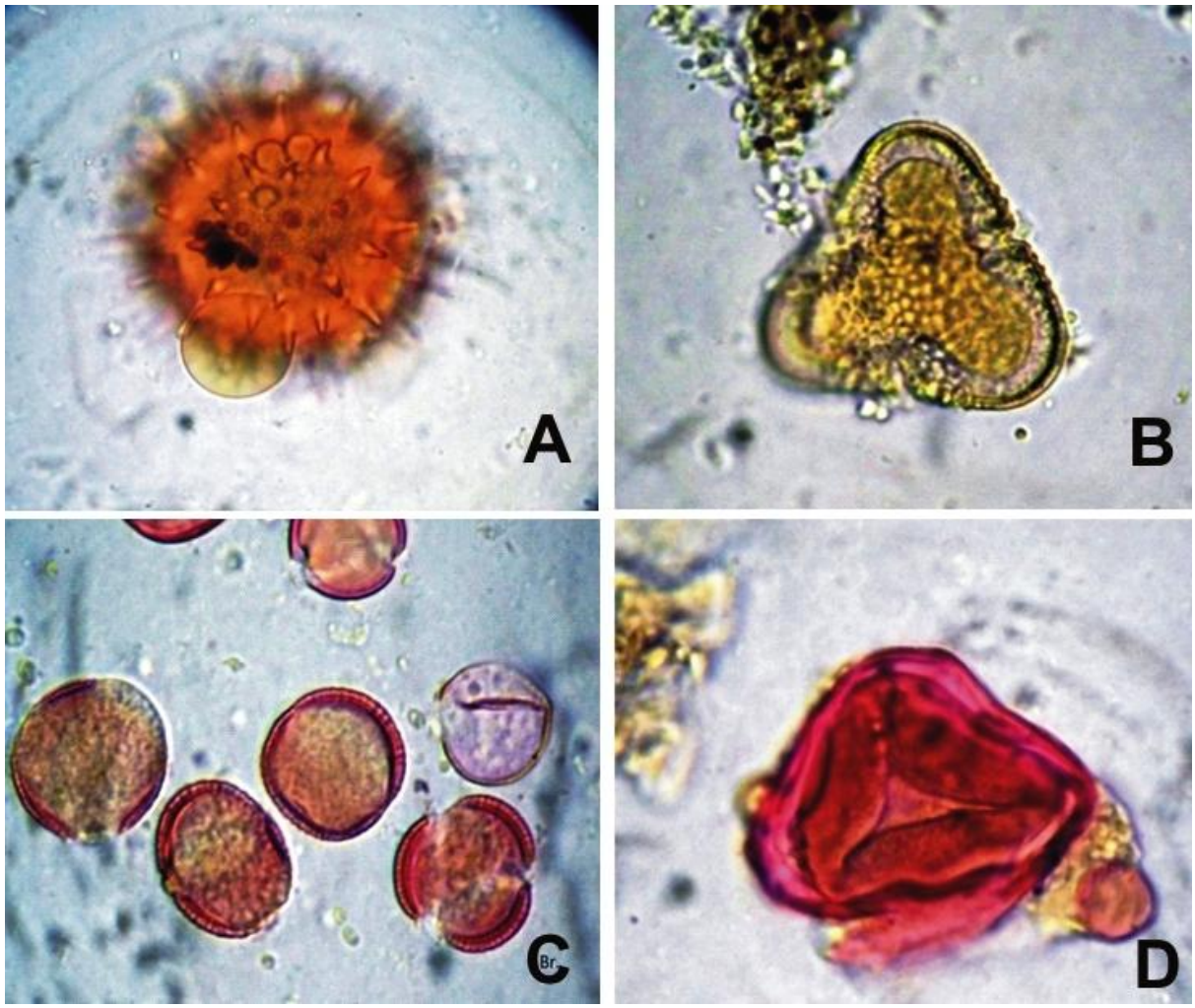

Figure 3: Pollen micrograph of some pollen A- *Hibiscus rosa-sinensis*. B- *Bombax ceiba*. C- *Brassica campestris*. D- *Cocos nucifera*.

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