J. Phytol. Res. 18(2) : 179-182, 2005

AZADIRACHTA INDICA L. – AN IMPORTANT SOURCE OF NECTAR AND POLLEN IN NADIA DISTRICT OF WEST BENGAL

SAIBAL CHATTOPADHYAY
District Land & Land Reforms Office, Jiban Pal's Garden, Hooghly – 712 103, India.
(Under the Directorate of Land Records & Surveys, Government of West Bengal)
E-mail: saibal10@rediffmail.com

Quality of honey is often determined by the category of its palynoassemblage. Presence of such palynoassemblage depends on the floral fidelity of the worker bees. Palynoanalysis of honey samples helps to identify the floral fidelity of the bees collecting honey. It reveals the bee flora of an area. Four samples of Nadia district have been undertaken for melissopalynological analysis: Only one sample has been detected as 'unifloral' predominated by *Azadirachta indica*. Three other samples are 'multifloral' type constituted of *Citrus* sp., *Borassus flavellifer* etc. as major source plant.

Keywords: Bee flora; Honey; Melissopalynological analysis.

Introduction

The essential raw materials of honey are nectar and pollen grains. During foraging the worker bees collect nectar mainly from flowers along with pollen grains for nourishment and growth of larvae and young adult bees in hives. Nectar is the source of carbohydrate and pollen is the major source of protein, fatty acid, minerals and vitamins. On evaporation by fanning of wings of the worker bees the nectar become ripened and then it is called 'Honey'.

It has been found that the bees often show floral fidelity to a particular species of plant[1]. They often intend to collect nectar from single species if such species is found abundant in a particular area. Floral fidelity of bee makes the honey qualitatively distinguishable from another. Presence of the pollen grain of a particular species in a honey sample by 45% or more of the total palynoassemblage in a sample is designated as a 'Unifloral Honey' which is usually distinct in flavour, colour and taste[2]. Pollen analysis of a honey sample is, therefore, an essential tool to assess its floral type, quality, geographical origin and foraging ecology.

Pollen analysis of a number of honey samples of different area of this country have been carried out especially in the recent years considering the food value including its medicinal as well as economic importance[2-7]. In West Bengal such studies have not got much interest of the botanist inspite of having a good potentiality of apiculture. This paper deals with the pollen analysis of the honey samples of Nadia, an agrarian district of West Bengal.

Materials and Method

The honey samples are of natural hives and have been collected from local people of different places of Kalyani, Madanpur, Chakdaha and Ranaghat of the Nadia district of West Bengal during December – January of 2000-2001. The squeezed samples are light yellow in colour and highly thick in density. The samples have been processed following alcohol diluted honey technique[8] and centrifuged for 15 minutes at 2500 r.p.m. The resultant sediment has been treated with 5 c.c. glacial acetic acid and have been acetolysed in a conventional method[9]. Slides have been prepared with glycerine jelly and sealed with wax. Prepared slides and honey samples have been kept in the Palynology Laboratory, Department of Botany, Kalyani University.

Results and Discussion

All the samples are found to be rich in pollen content. The pollen assemblages of all the samples are more or less similar (Table 1) but percentage of occurrence varies (Fig. 1). It is found that *Azadirachta indica* and *Citrus* sp. pollen types are found in higher frequency in all the samples. The Pollen Spectrum (Fig. 2) reflects the occurrence of pollen grains present in the each honey samples.

On the basis of frequencies of the pollen types recovered from the honey samples the pollen assemblages of the honey have been categorised into four categories as recommended by the International Commission for Bee Botany (ICBB)[10] . Those categories are (a) Predominant pollen types (45% and above), (b) Secondary pollen types (16-44%) (c) Important minor pollen types (3-15%) and (d) Minor pollen type (less than 3%).

In the honey sample collected from Kalyani, *A. indica* and *Citrus* sp. are the secondary major pollen type. *Oryza sativa*, *Brassica nigra* are considered as the important minor pollen type whereas *Psidium guajava*, *Tridax procumbens*, *Borassus flavellifer*, *Lagerstroemia* sp. are the minor pollen type.

In the sample of Madanpur, *A. indica* is the predominant pollen type, *Citrus* sp. is the single secondary major pollen type. *Coriandrum sativa*, *Oriza sativa*,

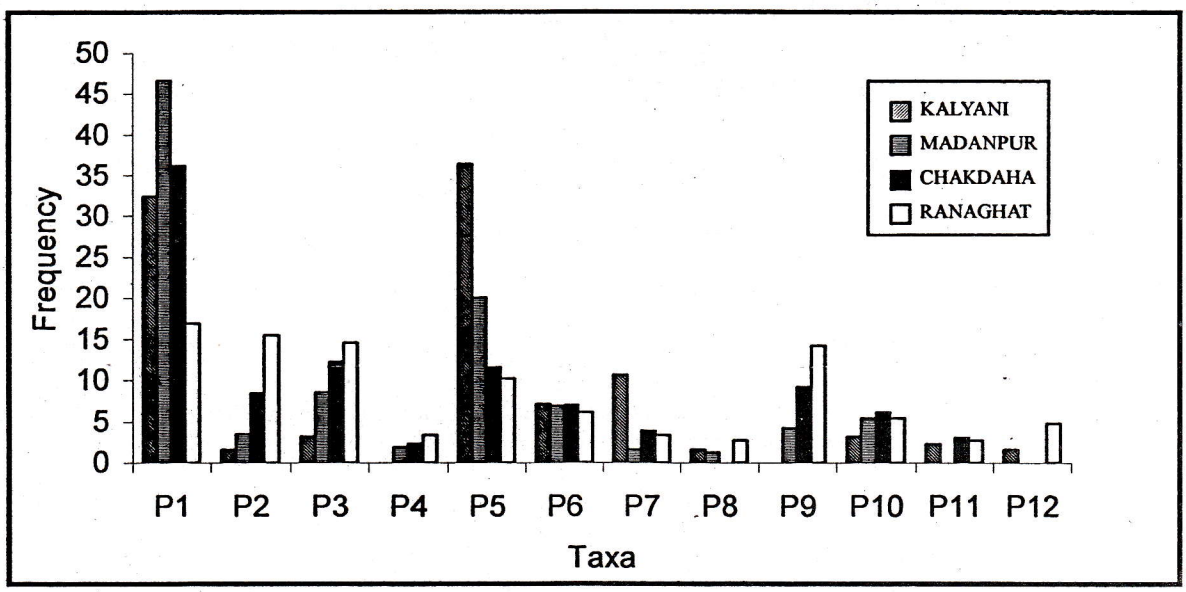

Fig. 1. Diagram showing frequency of each pollen type in different honey samples.

Table 1. Pollen analysis of honey samples of Nadia district.

Pollen taxa	Family	Habit	Frequency of pollen grains							
			Kalyani		Madanpur		Chakdaha		Ranaghat	
			Frequency	Category	Frequency	Category	Frequency	Category	Frequency	Category
Azadirachta indica	Meliaceae	Tree	32.44	B	46.66	A	36.15	B	16.89	C
Borassus flavellifer	Arecaceae	Tree	1.62	D	3.49	C	8.46	C	15.54	C
Brassica nigra	Brassicaceae	Herb	3.21	C	8.57	C	12.31	C	14.56	C
Cassia sp.	Caesalpiniaceae	Herb	—	—	1.93	D	2.31	D	3.38	C
Citrus sp	Rutaceae	Shrub	36.33	B	19.96	B	11.54	C	10.14	C
Coriandrum sativum	Apiaceae	Herb	7.07	C	6.9	C	6.92	C	6.08	C
Croton sp	Euphorbiaceae	Herb	10.61	C	1.58	D	3.85	C	3.38	C
Lagerstroemia sp	Lythraceae	Tree	1.6	D	1.26	D	—	—	2.7	C
Mangifera indica	Anacardiaceae	Tree	—	—	4.26	C	9.23	C	14.19	C
Oryza sativa	Poaceae	Herb	3.21	C	5.39	C	6.15	C	5.41	C
Psidium guajava	Myrtaceae	Shrub	2.25	C	—	—	3.08	C	2.7	C
Tridax procumbens	Asteraceae	Herb	1.6	D	—	—	—	—	4.73	C

A = Predominant pollen type, B = Secondary major Pollen type, C = Important minor pollen type, D = Minor Pollen Type

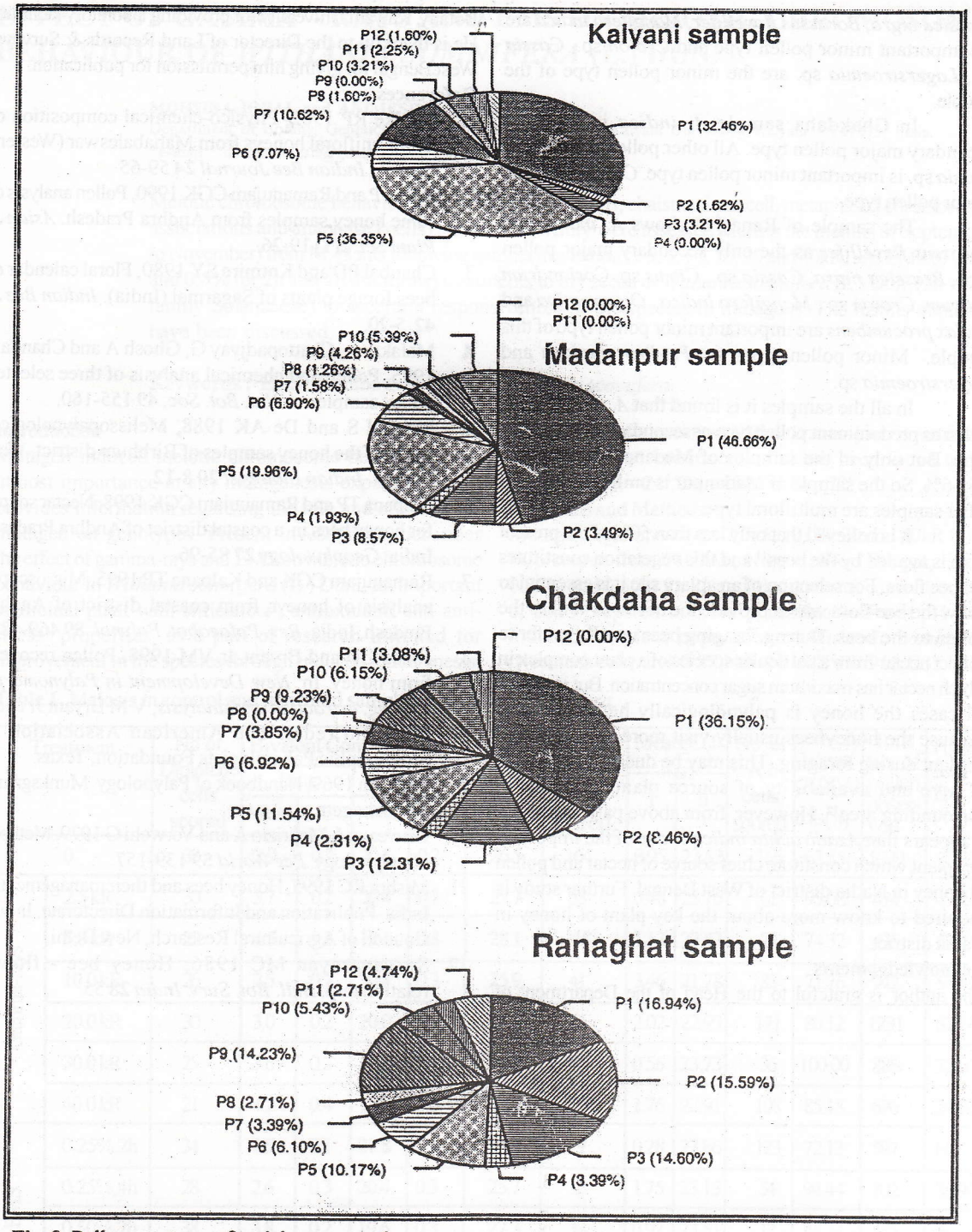

Fig. 2. Pollen spectrum of each honey sample.
P-1 = *Azadirachta indica*, P-2 = *Borasus flavellifer*, P-3 = *Brassica nigra*,
P-4 = *Cassia* sp, P-5 = *Citrus* sp, P-6 = *Coriandrum sativum*, P-7 = *Croton* sp,
P-8 = *Lagerstroemia* sp, P-9 = *Mangifera indica*, P-10 = *Oryza sativa*,
P-11 = *Psidium guajava*, P-12 = *Tridax procumbens*.

Brassica nigra, *Borassus flavellifer*, *Mangifera indica* are the important minor pollen type and *Croton* sp., *Cassia* sp., *Lagerstroemia* sp. are the minor pollen type of the sample.

In Chakdaha sample *A. indica* is the only secondary major pollen type. All other pollen type except *Cassia* sp. is important minor pollen type. *Cassia* sp. is the minor pollen type.

The sample of Ranaghat shows *A. indica* and *Borassus flavellifer* as the only secondary major pollen type, *Brassica nigra*, *Cassia* sp., *Citrus* sp. *Coriandrum sativum*, *Croton* sp., *Mangifera indica*, *Oryza sativa* and *Tridax procumbens* are important minor pollen type of this sample. Minor pollen types are *Psidium guajava* and *Lagerstroemia* sp.

In all the samples it is found that *A. indica* ranks either as predominant pollen type or secondary major pollen type. But only in the samples of Madanpur it exists by 46.66%. So the sample of Madanpur is unifloral type. All other samples are multifloral type.

It is believed that only less than 50% of the present flora is availed by the bees[11] and this vegetation constitutes the bee flora. For selection of an apiary site it is essential to know the bee flora which provide the nectar as well as the pollen to the bees. During foraging bees usually prefer to collect nectar from a particular species of a plant complex in which nectar has maximum sugar concentration. But in almost all cases the honey is palynologically heterogeneous because the honeybees usually visit more than one type of plant during foraging. This may be due to urgent need of hive and availability of source plant of nectar in surrounding area[12]. However, from above palynoanalysis it appears that *Azadirachta indica* is one of the important key plant which constitute chief source of nectar and pollen of honey in Nadia district of West Bengal. Further study is required to know more about the key plant of honey in Nadia district.

Acknowledgements

The author is grateful to the Head of the Department of Botany, Kalyani University for providing laboratory facilities. He is thankful to the Director of Land Records & Surveys, West Bengal for giving him permission for publication.

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