

Pollen analysis of winter honey samples from Bankura district, West Bengal

Anandamoy Bandyopadhyay, D. Jana and Subir Bera

Botany Department, Calcutta University, Kolkata – 700 019

Bandyopadhyay, A., Jana, D. & Bera, S. 2005. Pollen analysis of winter honey samples from Bankura district, West Bengal. *Geophytology* 35 (1&2): 1-6.

Present paper deals with qualitative and quantitative pollen analyses of 26 apiary honey samples (*Apis cerana indica*) and 4 squeezed honey samples (*A. florea*) collected during November – February, 1999-2001 from Bankura District, West Bengal. 50% of honey samples were found to be unifloral with *Brassica nigra*, *Eucalyptus globulus*, *Sizygium cumini*, *Phoenix sylvestris*, *Zizyphus jujuba*, *Schleichera trijuga* and *Ailanthus excelsa*. Other important reliable sources of nectar for honey bees during winter were also identified.

Key-words—Melittopalynology, Nectar source, Winter honey, Bankura, West Bengal.

INTRODUCTION

BANKURA district is located between 22°38'N and 23°38'N latitudes and 86°36' and 87°46'E longitudes in West Bengal, India (Map 1). Phytogeographically this district is dry and falls under Sal (*Shorea robusta*) forested areas and has rich vegetation with vast agricultural tracts and orchards of mango, litchi, guava, jamun, gokul, kusum, jackfruit, etc. The district is going to achieve a break through in yields of grains, pulses, oil seeds, vegetables and orchard crops but the importance of bee keeping is still ignored in this region. Most of the farmers are not even aware of the possibility of increasing crop yield by keeping bee hives during flowering of their agricultural crops. Although three types of major Indian honey bees, viz. *Apis florea*, *Apis cerana indica* and *Apis dorsata* are found in this area yet the average honey production is 300 quintals (approx.) per annum and only 175 families are partly engaged in apiary honey production (personal communication with Directorate of Small Industries, Bankura district).

Earlier records of honey pollen analysis in West Bengal come from the districts of Darjeeling, Jalpaiguri, West Dinajpur, Murshidabad, Midnapore, Kolkata, North and South 24 Parganas of West Bengal (Sen & Banerjee 1956, Mondal & Mitra 1980, Ganguly *et al.* 1984, Malakar *et al.* 1995, Bera *et*

al. 1997, Kumar 2000, Jana *et al.* 2002). The present investigation deals with microscopic analysis of winter honey samples from Bankura district for the first time.

MATERIAL AND METHOD

30 honey samples (26 apiary honey samples of *Apis cerana indica* origin and 4 squeezed samples of *A. florea* origin), 100 ml each, have been collected from different Block and Gram Panchayat areas of three subdivisions (Bankura, Bishnupur, Khatra) of Bankura district during the period from November – February, 1999-2001. Both apiary and squeezed honey samples were collected (Table 1).

The honey samples were subjected to acetolysis following standard method (Erdtman 1960). 3-5 slides were prepared for each sample and examined for pollen content. 300 pollen grains per sample were counted to consider the geographical identities of the honey types. The pollen types recovered were identified to generic and specific level and in some cases up to the families with the help of reference pollen slides of the local flora, photographs and relevant literatures. The methodology recommended by International Commission for Bee Botany (Louveaux *et al.* 1978) was employed for the recovery and analysis of the pollen content from honey samples. The absolute

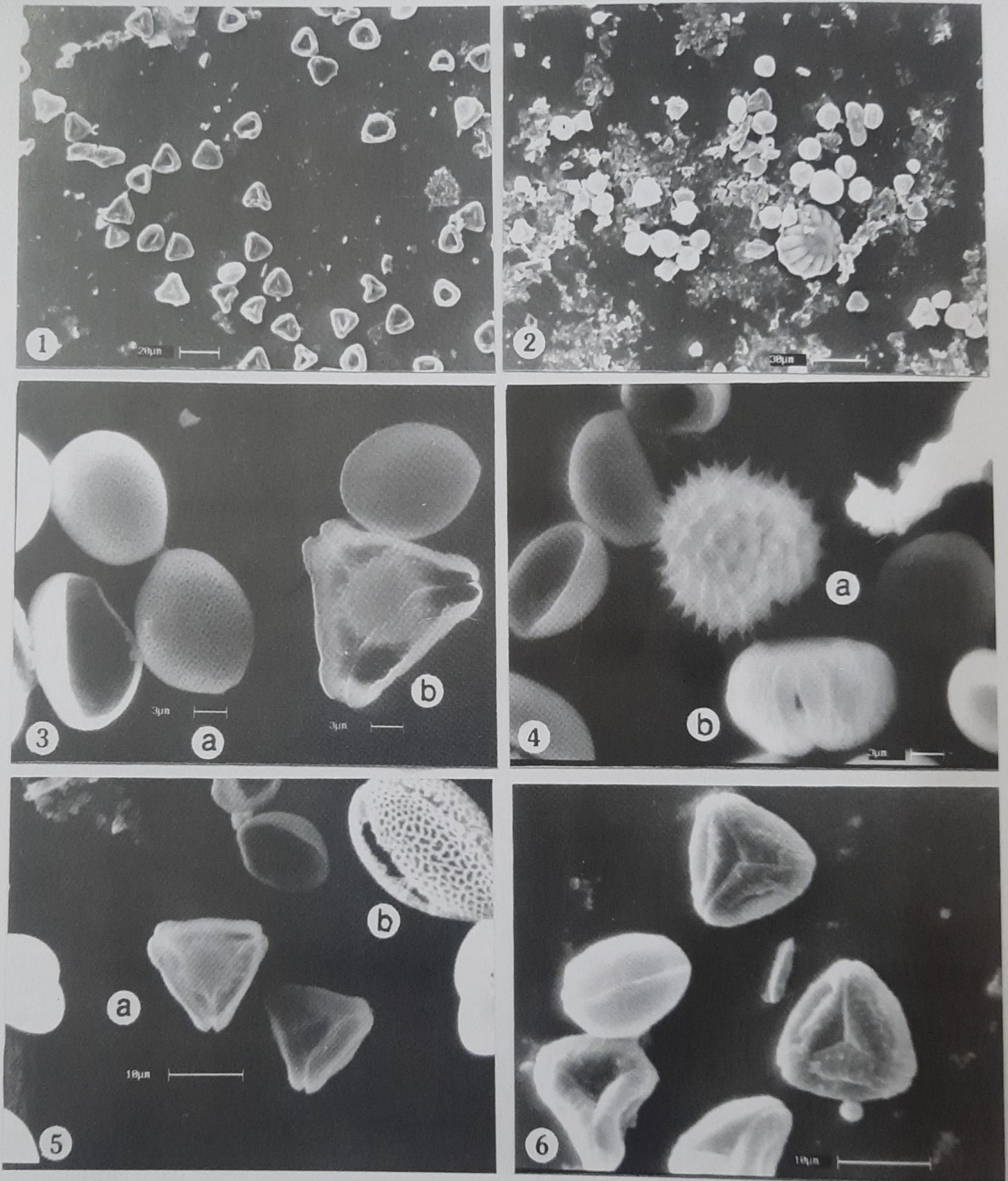
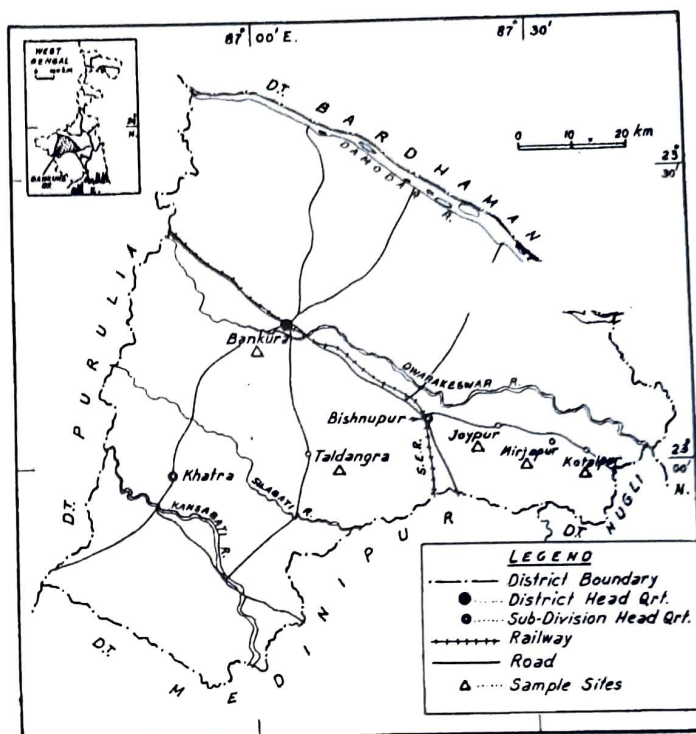


PLATE 1

1. *Eucalyptus globulus* (unifloral), 2. Multifloral with *Sesamum indicum*, 3a. *Phoenix sylvestris*, 3b. *Eucalyptus globulus*, 4a. *Ageratum* sp., 4b. *Brassica nigra*, 5a. *Psidium guajava*, 5b. *Brassica* sp., 6. *Eucalyptus globulus*

Table 1. Details of honey samples collected from Bankura district

Samples No.	Place of Collection	Sudivision	Time of collection	Type of honey
B (BP) - 1	Joypur	Bishnupur	Nov	Apiary honey
B (BP) - 2	Joypur	Bishnupur	Dec	Apiary honey
B (BP) - 3	Mirjapur	Bishnupur	Dec	Apiary honey
B (BP) - 4	Joypur	Bishnupur	Feb	Apiary honey
B (BP) - 5	Joypur	Bishnupur	Feb	Apiary honey
B (BP) - 6	Joypur	Bishnupur	Feb	Apiary honey
B (BP) - 7	Joypur	Bishnupur	Dec	Apiary honey
B (BP) - 8	Mirjapur	Bishnupur	Dec	Apiary honey
B (BP) - 9	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 10	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 11	Joypur	Bishnupur	Jan	Apiary honey
B (BP) - 12	Joypur	Bishnupur	Dec	Apiary honey
B (BP) - 13	Kotalpur	Bishnupur	Nov	Squeezed honey
B (BP) - 14	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 15	Sonamukhi	Bishnupur	Dec	Apiary honey
B (BP) - 16	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 17	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 18	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 19	Kotalpur	Bishnupur	Jan	Apiary honey
B (BP) - 20	Kotalpur	Bishnupur	Feb	Apiary honey
B (BP) - 21	Kotalpur	Bishnupur	Jan	Apiary honey
B (KH) - 22	Taldangra	Khatra	Jan	Apiary honey
B (KH) - 23	Taldangra	Khatra	Dec	Apiary honey
B (KH) - 24	Taldangra	Khatra	Jan	Squeezed honey
B (KH) - 25	Taldangra	Khatra	Jan	Squeezed honey
B (BK) - 26	Bankura	Bankura	Dec	Apiary honey
B (BK) - 27	Bankura	Bankura	Jan	Squeezed honey
B (BK) - 28	Bankura	Bankura	Jan	Apiary honey
B (BK) - 29	Bankura	Bankura	Dec	Apiary honey
B (BK) - 30	Bankura	Bankura	Dec	Apiary honey



Map 1. Map of Bankura district showing sample sites

pollen counts (APC) of honey samples were (the number of pollen grains per 10 g. honey) calculated following the method adopted by Suryanarayana *et al.* (1981).

OBSERVATION AND DISCUSSION

Qualitative and quantitative analyses of honey samples from three sub-divisions of Bankura district were carried out. Among 30 samples analysed 15 were found to be unifloral. Pollen analytical data of unifloral honeys is given in Table 2. Thirty three pollen taxa belonging to twenty four dicotyledonous families

and three monocotyledonous families have been recovered (Pl. 1, Figs. 1-6; Pl. 2, Figs. 1-6) from the honey samples. The members of Brassicaceae, Rhamnaceae, Simaroubaceae, Myrtaceae, Sapindaceae, Apiaceae, Asteraceae, Liliaceae, Poaceae and Arecaceae are found to be important nectar and pollen sources for honey bees. Among 30 samples studied in the present investigation, 15 (50%) are found to be unifloral with *Brassica nigra*, *Zizyphus jujuba*, *Eucalyptus globulus*, *Sizygium cumini* *Phoenix sylvestris*, *Ailanthus excelsa* and *Schleichera trijuga* as chief nectar sources for honey bees in the area during winter. Majority of the honey samples collected during winter showed the presence of *Brassica - Zizyphus - Eucalyptus - Sizygium - Phoenix* pollen complex. This data is well in conformity with that recorded from Murshidabad district (Jana *et al.* 2002). The other important nectar sources in the area of present study are *Terminalia*, *Acacia*, *Mimosa*, *Carum*, *Coriandrum*, *Borassus*, *Alangium*, *Moringa*, *Ageratum*, *Psidium*, *Croton*, *Amaranthus* and *Bombax*.

A total of 33 pollen taxa belonging to 27 families have been recorded from presently studied 30 honey samples. The present microscopic analysis of winter

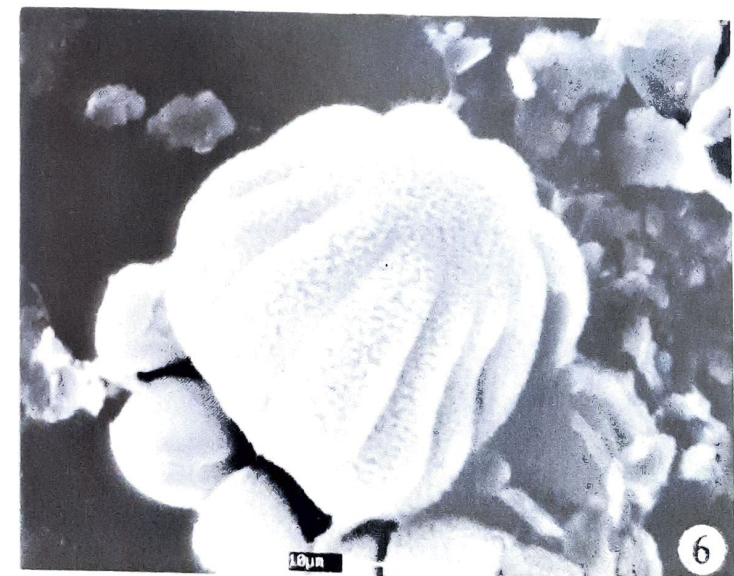
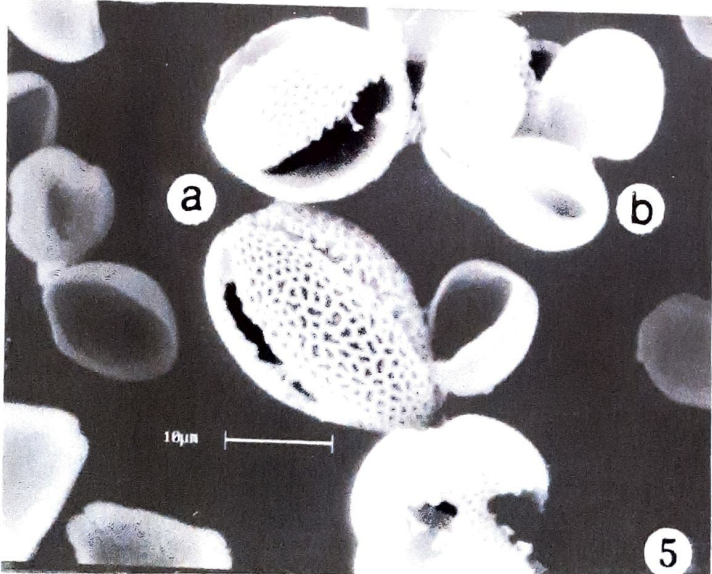
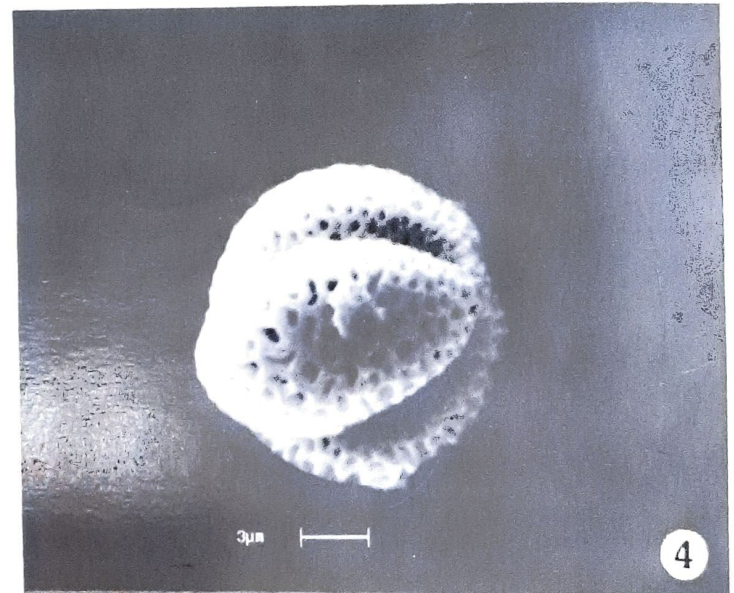
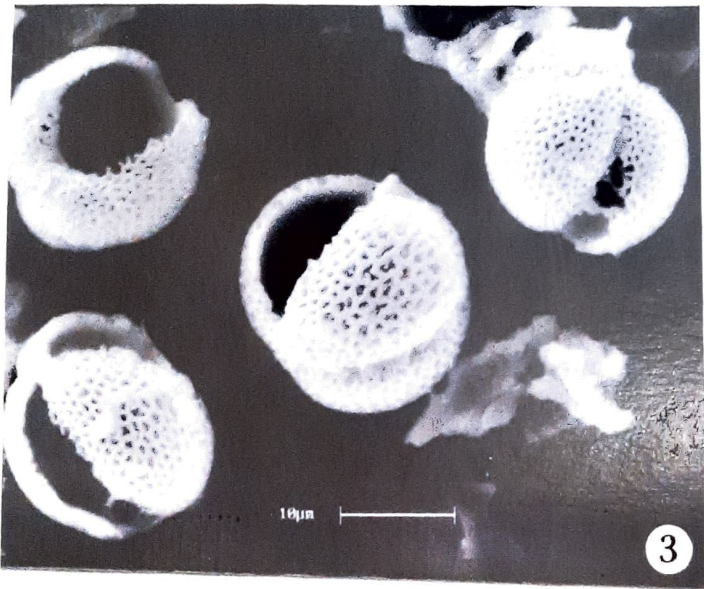
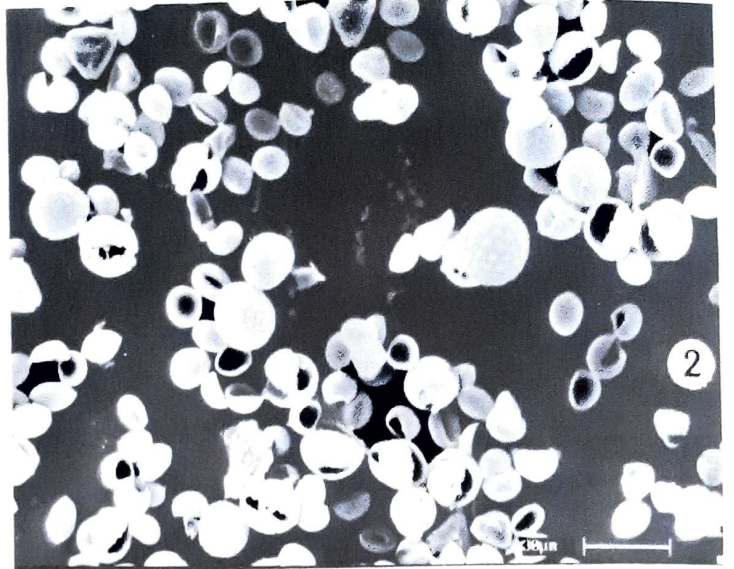
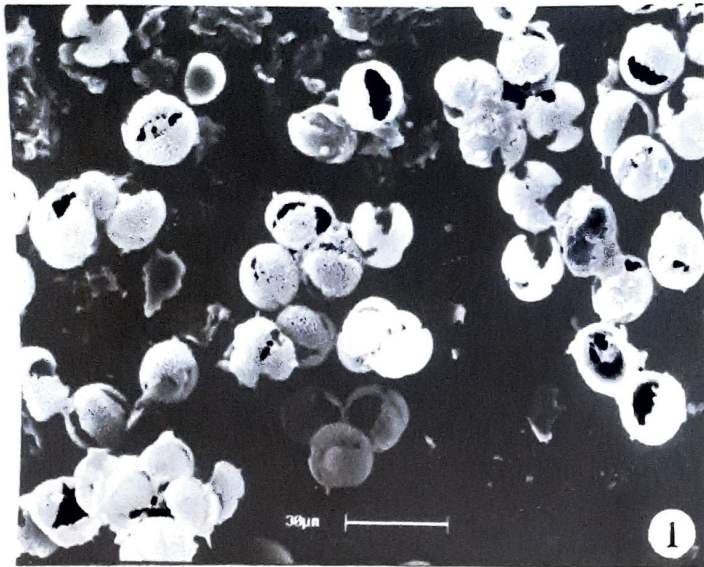


PLATE 2

1. *Brassica nigra* (unifloral), 2. *Phoenix sylvestris* (unifloral), 3. *Brassica nigra*, 4. *Brassica nigra*, 5a. *Brassica* sp., 5b. *Phoenix* sp., 6. *Sesamum indicum*

Table 2. Pollen analytical data of unifloral winter honeys from Bankura district, West Bengal

Subdivision	Unifloral honey samples	Predominant pollent type %	Other important taxa (%) (Group)	APC
Bishnupur	B (BP) – 6	<i>Brassica nigra</i> (70.5%)	<i>Ailanthus excelsa</i> (12.25%), <i>Feronia elephantum</i> (1%), <i>Eucalyptus globulus</i> (5.25%) <i>Zizyphus jujuba</i> (9.5%), <i>Barringtonia</i> sp. (2.0%)	1147200 (IV)
	B (BP) – 8	<i>Brassica nigra</i> (54%)	<i>Acacia nilotica</i> (9.25%), <i>Eucalyptus globulus</i> (8.5%), <i>Croton bonplandianum</i> (5.0%), <i>Sizygium cumini</i> (5.25%), <i>Borassus flabellifer</i> (6%), <i>Zizyphus jujuba</i> (4.5%), <i>Cyanotis</i> sp. (1.5%), <i>Terminalia arjuna</i> (4.25%), <i>Ageratum conyzoides</i> (2.5%)	6960 (I)
	B (BP) – 9	<i>Zizyphus jujuba</i> (65%)	<i>Eucalyptus globulus</i> (8.25%), <i>Brassica nigra</i> (12%), <i>Terminalia arjuna</i> (6.07%), <i>Borassus flabellifer</i> (2.75%), <i>Sizygium cumini</i> (5%), <i>Barringtonia</i> sp. (1.5%)	68400 (II)
	B (BP) – 10	<i>Phoenix sylvestris</i> (48%)	<i>Brassica nigra</i> (12.25%), <i>Sizygium cumini</i> (8.5%), <i>Schleichera trijuga</i> (10.75%), <i>Mimosa pudica</i> (5%), <i>Litchi chinensis</i> (4%), <i>Amaranthus</i> sp. (6.37%), <i>Croton bonplandianum</i> (3.5%), <i>Carum copticum</i> (2.15%)	326400 (III)
	B (BP) – 11	<i>Zizyphus jujuba</i> (50.16%)	<i>Brassica nigra</i> (16.5%), <i>Amaranthus</i> sp. (7.5%), <i>Terminalia arjuna</i> (2.67%), <i>Phoenix sylvestris</i> (3.25%), <i>Borassus flabellifer</i> (5.07%), <i>Psidium guajava</i> (2.5%), <i>Coriandrum sativum</i> (0.75%), <i>Mimosa pudica</i> (5.75%), <i>Bombax malabaricum</i> (4%), <i>Alangium salvifolium</i> (2.5%)	1204500 (V)
	B (BP) – 12	<i>Zizyphus jujuba</i>	<i>Brassica nigra</i> (26%), <i>Mimosa pudica</i> (58.33%) (5.5%), <i>Eucalyptus globulus</i> (8.25%), <i>Acacia nilotica</i> (2.5%)	1425700 (V)
	B (BP) – 14	<i>Eucalyptus globulus</i> (52.0%)	<i>Acacia nilotica</i> (5%), <i>Amaranthus</i> sp. (5.5%), <i>Brassica nigra</i> (21.37%), <i>Moringa oleifera</i> (4.5%), <i>Phoenix sylvestris</i> (8.75%), <i>Casuarina equisetifolia</i> (2.25%)	1108400 (V)
	B (BP) – 15	<i>Ailanthus excelsa</i> (62.5%)	<i>Brassica nigra</i> (12.33%), <i>Phoenix sylvestris</i> (6%), <i>Amaranthus</i> sp. (3.05%), <i>Zizyphus jujuba</i> (5.37%), <i>Chenopodiaceae</i> (1%), <i>Croton bonplandianum</i> (5.2%), <i>Butea monosparma</i> (4.5%), <i>Sesamum indicum</i> (0.75%)	700000 (IV)
	B (BP) – 16	<i>Brassica nigra</i> (63.37%)	<i>Carum copticum</i> (9.5%), <i>Coriandrum sativum</i> (6.75%), <i>Psidium guajava</i> (12.37%), <i>Mimosa pudica</i> (5.25%), <i>Poaceae</i> (2.75%)	10670 (I)
	B (BP) – 17	<i>Sizygium cumini</i> (58.16%)	<i>Croton bonplandianum</i> (5.05%), <i>Brassica nigra</i> (6.25%), <i>Eucalyptus globulus</i> (8.35%), <i>Amaranthus</i> sp. (4.5%), <i>Acacia nilotica</i> (4.75%), <i>Borassus flabellifer</i> (3.5%), <i>Terminalia arjuna</i> (5.5%), <i>Ageratum conyzoides</i> (3%), <i>Butea monosparma</i> (1.5%)	1230500 (V)
	B (BP) – 21	<i>Phoenix sylvestris</i> (47.0%)	<i>Eucalyptus globulus</i> (9.6%), <i>Schleichera trijuga</i> (11.5%), <i>Ailanthus excelsa</i> (8.16%), <i>Borassus flabellifer</i> (7%), <i>Croton bonplandianum</i> (2%), <i>Zizyphus jujuba</i> (5.7%), <i>Casuarina equisetifolia</i> (1.5%), <i>Acacia nilotica</i> (4%), <i>Mimosa pudica</i> (2.75%)	32680 (II)

contd...

Table 2. Contd...

Subdivision	Unifloral honey samples	Predominant pollent type %	Other important taxa (%) (Group)	APC
Khatra	B (KH) – 23	<i>Eucalyptus globulus</i> (59.5%)	<i>Acacia nilotica</i> (3.5%), <i>Brassica nigra</i> (10%), <i>Phoenix sylvestris</i> (7.25%), <i>Mimosa pudica</i> (3%), <i>Casuarina equisetifolia</i> (2.7%), <i>Zizyphus jujuba</i> (3.5%), <i>Sizygium cumini</i> (2%), <i>Amaranthus</i> sp. (6.0%), Poaceae (1.5%), <i>Oroxylum indicum</i> (0.5%), <i>Dendrophthoe</i> sp. (0.75%)	117040 (III)
	B (KH) – 24	<i>Sizygium cumini</i> (54.75%)	<i>Phoenix sylvestris</i> (7.5%), <i>Psidium guajava</i> (5%), <i>Mimosa pudica</i> (3.5%), <i>Zizyphus jujuba</i> (6%), <i>Eucalyptus globulus</i> (4.25%), <i>Brassica nigra</i> (7.25%), <i>Coriandrum sativum</i> (1.5%), <i>Terminalia arjuna</i> (4.75%), <i>Amaranthus</i> sp. (5%), <i>Nymphaea</i> sp. (0.5%)	209000 (III)
	B (KH) – 25	<i>Schleichera trijuga</i>	<i>Carum copticum</i> (10.33%), <i>Amaranthus</i> sp. (7.5%), <i>Phoenix</i> (49.60%) <i>sylvestris</i> (5%), <i>Ailanthus excelsa</i> (4.75%), <i>Brassica nigra</i> (5.5%), <i>Ageratum conyzoides</i> (1.25%), <i>Mimosa pudica</i> (1.16%), <i>Acacia nilotica</i> (2.5%), <i>Zizyphus jujuba</i> (1.5%), <i>Sizygium cumini</i> (2%), <i>Casuarina equisetifolia</i> (1.7%), Chenopodiaceae (1%), <i>Moringa oleifera</i> (3.5%), <i>Orassus flabellifer</i> (3.37%)	1389750 (V)
Bankura	B (BK) – 28	<i>Phoenix sylvestris</i> (51.75%)	<i>Eucalyptus globulus</i> (7.5%), <i>Carum copticum</i> (10%), <i>Amaranthus</i> sp. (5.16%), <i>Mimosa pudica</i> (4.5%), <i>Sizygium cumini</i> (5%), <i>Acacia nilotica</i> (3.25%), <i>Brassica nigra</i> (2.5%), <i>Ailanthus excelsa</i> (1.75%), <i>Schleichera trijuga</i> (8.25%), Liliaceae (0.5%)	607850 (IV)

honey samples collected from three subdivisions of Bankura district thus explores the possibility of utilizing rich bee flora for the development of bee keeping enterprises. Bishnupur subdivision proves to be more suitable area for this apicultural venture wherefrom 11 unifloral honeys are recorded against 3 in Khatra and 1 in Bankura subdivision.

ACKNOWLEDGEMENT

We thank Sri Satya De, Bee Keeper, Kotalpur, Bankura and Sri Mahadeb Pal, Development Officer, DIC, Bankura for the supply of honey samples.

REFERENCES

- Bera, Subir, Mukhopadhyay, SK, Dhar, J, Das, AP & De S 1997. A melittopalynological investigation of *Apis cerana indica* Fabr. summer honey from Sikkim and sub-Himalayan West Bengal, India. *J. Palynol.* **33** : 209-128.
- Deodikar, GB 1964. Melittopalynology 404-419 in Nair P.K.K. (ed.) - Advances in Palynology.
- Erdtman, G 1960. The acetolysis method. A revised description *Sven. Botan. Tidskr.* **54** : 561-564.
- Jana, D, Bandyopadhyay A & Bera, Subir 2002. Pollen analysis of winter honey samples from Murshidabad district, West Bengal. *Geophytology* **30** : 91-97.
- Kumar, R 2000. Studies on Pollen and nectar yielding plants of honey bees at Paliatow, District 24 Parganas, West Bengal, India. *Geophytology* **29** : 89-93.
- Louveaux, J, Mourizio, A & Vorwohl, G 1978. Methods of Melissopalynology. *Bee World* **59** : 139-157.
- Malakar, A, Chattopadhyay, G, Ghosh, A & Chanda, S 1995. Pollen and chemical analysis of three selected honey samples. *J. Nat. Bot. Soc.* **49** : 155-160.
- Mondal, Madhusudan & Mitra, Krishna 1980. Pollen analysis of honey from Sundarban (West Bengal.) *Geophytology* **10** : 137-139.