

Pollen diversity in the honey samples from Medak district, Andhra Pradesh

P.K. Chaya and Y.N.R. Varma

P.G. College of Science, Osmania University, Hyderabad-500 004

Chaya, P.K. & Varma, Y.N.R. 2004. Pollen diversity in the honey samples from Medak district Andhra Pradesh. *Geophytology* 34 (1 & 2): 95-100.

Pollen contents of five squeezed honey samples of *Apis florea*, collected during winter (1996-97) from Narsapur (three samples) and Hathnura (two samples) mandals of Medak district of Andhra Pradesh were studied for their diversity.

All the three samples from Narsapur were found to be unifloral, while from Hathnura mandal, one sample was unifloral and other multifloral. The Narsapur mandal mostly of forested and the Hathnura mandal, is extensive agricultural tracts. Significant pollen diversity is observed in the honey samples of these two neighbouring mandals. Narsapur honeys are characterised by *Phoenix sylvestris* (in two samples) and *Eucalyptus globulus* (in one sample) as the predominant pollen types. The unifloral honey of Hathnura mandal shows *Sphaeranthus indicus* as the predominant pollen type. The multifloral honey from this mandal shows *Eucalyptus globulus*, *Helianthus annuus* and *Carthamus tinctorius* as secondary pollen types.

Key-words—Pollen diversity, *Apis florea* honey, Medak district, Andhra Pradesh, Southern India.

INTRODUCTION

THE present investigation deals with a microscopic analysis of the pollen contents of five squeezed honeys of *Apis florea* collected from Narsapur and Hathnura of Medak district (between 17° 27' and 18° 18' north latitudes and 79° 28' and 79° 10' east longitudes) of Andhra Pradesh. Narsapur is covered by forest area and the flora here comprises mostly of wild plants, whereas in Hathnura, there are extensive agricultural crop plants along with weeds.

MATERIAL AND METHOD

Five squeezed honey samples of *Apis florea* combs were collected from two adjacent mandals of Medak district viz., Narsapur and Hathnura during winter 1996-97. Squeezing of the honey combs was carried out under personal supervision of the authors. Only the honey storing portion of the combs was subjected to squeezing for obtaining essentially pure honey. Of the five samples, three were collected from Narsapur and two from Hathnura (Table 1).

The methodology recommended by the International Commission for Bee Botany (Louveaux *et*

al. 1978) was employed for the processing of the material, recovery and analysis of the pollen contents of the honey samples. The recovered pollen types were placed under four frequency classes viz., predominant pollen type (>45% of the total pollen count of nectariferous taxa), secondary pollen types (16-45%), important minor pollen types (3-15%) and minor pollen types (<3%). Honeys with a predominant pollen type (with >45% of the pollen of nectariferous taxa) were designated as 'unifloral honeys' and those without a predominant pollen type are designated as 'multifloral honeys'.

The visual perspective of all such pollen types represented by more than 3% in each honey sample were depicted in the form of pollen spectra.

Table 1. Inventory of honey samples

Sample code	Mandal	Village	Date of collection	Colour
MNN-16a	Narsapur	Narsapur	18.01.97	Light amber
MNN-16b	Narsapur	Narsapur	18.01.97	Amber
MNN-16c	Narsapur	Narsapur	18.01.97	Light amber
MHM-18a	Hathnura	Mangapuram	17.02.96	Light amber
MHM-18b	Hathnura	Mangapuram	17.02.96	Light yellow

OBSERVATION

Of the five honey samples, four samples were found to be unifloral and one was multifloral. All

the three samples from Narsapur mandal were found to be unifloral with *Phoenix sylvestris* in two (MNN-16a & MNN-16c) samples and *Eucalyptus globulus* in one (MNN-16b) sample representing as the predominant pollen types. *Sphaeranthus indicus* is the only pollen type representing as the secondary pollen type in Narsapur honeys.

One sample (MHM-18b) from Hathnura mandal was found to be unifloral with *Sphaeranthus indicus* as the predominant pollen type and *Carthamus tinctorius* as the secondary pollen type. The only multifloral honey sample (MHM-18a) from Hathnura mandal record *Eucalyptus globulus*, *Helianthus annuus* and *Carthamus tinctorius* as the secondary pollen type. The other noteworthy pollen types recorded upto important minor (3-15%) category include, *Carthamus tinctorius*, *Sphaeranthus indicus*, *Ricinus communis*, and *Prosopis juliflora* from Narsapur honeys and *Helianthus annuus*, *Coriandrum sativum*, *Eucalyptus globulus* and *Tridax procumbens* from Hathnura honeys.

20 pollen types were recorded as minor pollen types from Narsapur honeys and 21 pollen types from Hathnura honeys. The significant and characteristic pollen types recovered from Narsapur and Hathnura honeys are illustrated in Plate-1.

A total of 25 pollen types (23 of melliferous and 2 of non-melliferous taxa) referable to 17 families from Narsapur honeys from Hathnura honeys 30 pollen types (25 of melliferous and 5 of non-melliferous taxa) referable to 19 families were recorded (Table 2).

Pollen analysis of honey samples also revealed the occurrence of non-melliferous or anemophilous taxa. Two pollen types viz., *Sorghum vulgare* and *Achyranthus* sp. from Narsapur honeys and five pollen types viz., *Cyperus rotundus*, grass pollen, *Oryza sativa*, *Zea mays* and *Casuarina equisetifolia* from Hathnura honeys were recorded. The occurrence of these pollen types in minor percentages can be attributed to contamination by wind, as the combs of *Apis florea* are found in exposed areas or inadvertently brought by the bees themselves. Table 3 provides the detailed information on the fre-

Table 2. Pollen types recorded from Honey of Narsapur and Hathnura mandals of Medak district.

Pollen type	Narsapur	Hathnura
Acanthaceae		
<i>Asteracantha longifolia</i>	+	+
<i>Lepidagathis cristata</i>	+	-
<i>Rungia repens</i>	+	-
Alangiaceae		
<i>Alangium salvifolium</i>	-	+
Amaranthaceae		
<i>Celosia argentea</i>	-	+
Anacardiaceae		
<i>Mangifera indica</i>	+	-
Arecaceae		
<i>Phoenix sylvestris</i>	+	+
Asteraceae		
<i>Ageratum conyzoides</i>	+	+
<i>Caesulia axillaris</i>	+	-
<i>Carthamus tinctorius</i>	+	+
<i>Helianthus annuus</i>	-	+
<i>Launaea pinnatifida</i>	-	+
<i>Sphaeranthus indicus</i>	+	+
<i>Tridax procumbens</i>	+	+
<i>Xanthium strumarium</i>	-	+
Capparidaceae		
<i>Capparis zeylanica</i>	+	-
Chenopodiaceae		
<i>Chenopodium album</i>	-	+
Commelinaceae		
<i>Commelina bengalensis</i>	-	+
<i>Cyanotis</i> sp.	-	+
Convolvulaceae		
<i>Evolvulus alsinoides</i>	+	+
Cruciferae		
<i>Brassica nigra</i>	+	-
Euphorbiaceae		
<i>Chrozophora prostata</i>	-	+
<i>Ricinus communis</i>	+	+
Mimosaceae		
<i>Acacia nilotica</i>	+	-
<i>Prosopis juliflora</i>	+	+
<i>Prosopis spicigera</i>	+	-
Myrtaceae		
<i>Eucalyptus globulus</i>	+	+
Papilionaceae		
<i>Cajanus cajan</i>	+	+
Solanaceae		
<i>Capsicum frutescens</i>	+	+
Simaroubaceae		
<i>Ailanthus excelsa</i>	+	-
Tiliaceae		
<i>Triumfetta rhomboidea</i>	+	+
Umbelliferae		
<i>Carum capticum</i>	+	+
<i>Coriandrum sativum</i>	-	+

quency classes and percentage of the various pollen types recovered from the honey samples. The pollen spectra of the honeys studied are shown in figure 1.

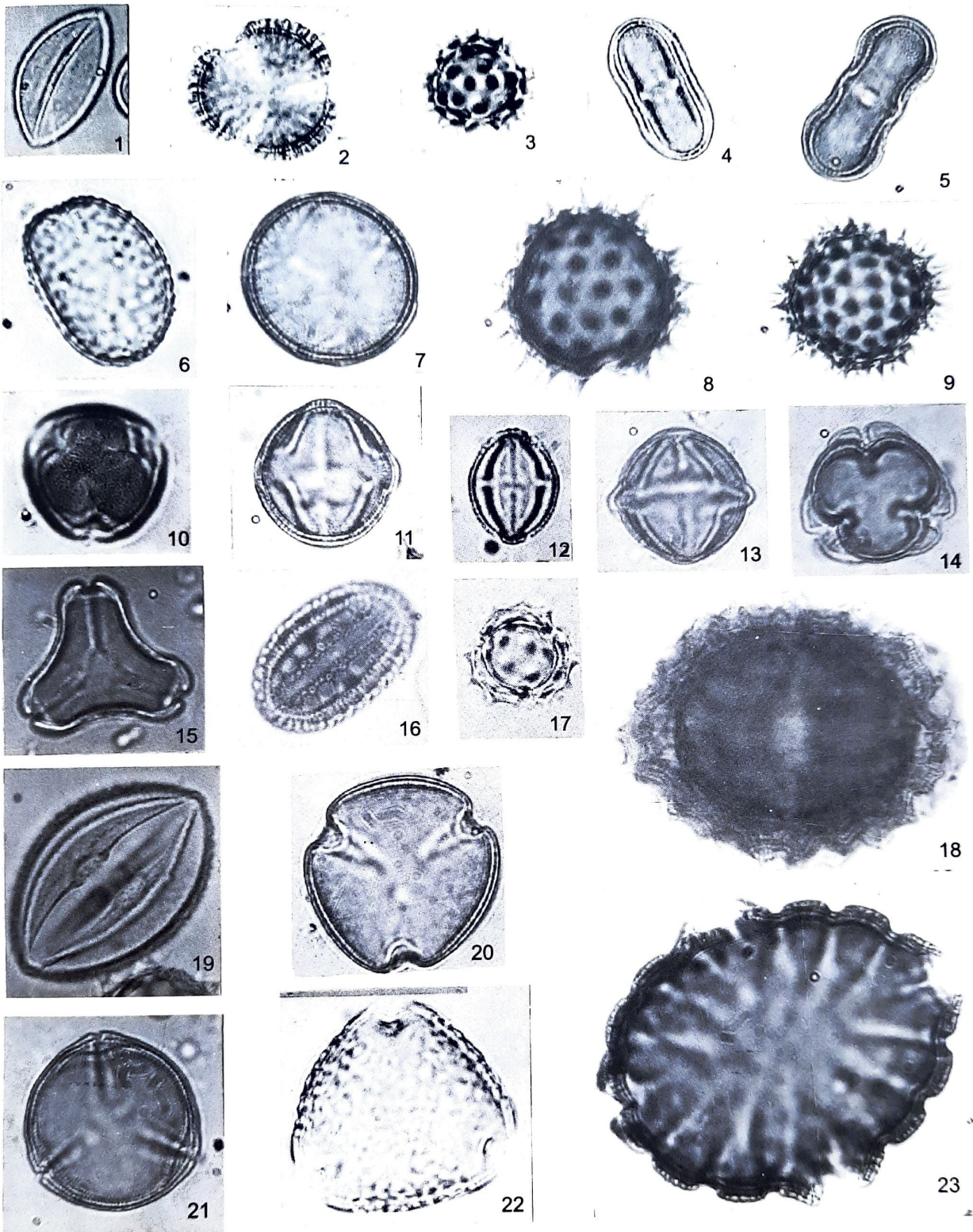


PLATE 1

(all figures x1000)

1. *Phoenix sylvestris*, 2. *Brassica nigra*, 3. *Sphaeranthus indicus*, 4. *Carum copticum*, 5. *Coriandrum sativum*, 6. *Commelina bengalensis*, 7. *Evolvulus alsinoides*, 8. *Helianthus annuus*, 9. *Tridax procumbens*, 10,11. *Mangifera indica*, 12. *Capparis zeylanica*, 13, 14. *Capsicum frutescens*, 15. *Eucalyptus globulus*, 16. *Lepidagathis cristata*, 17. *Ageratum conyzoides*, 18. *Carthamus tinctorius*, 19, 20. *Prosopis juliflora*, 21. *Ricinus communis*, 22. *Cajanus cajan*, 23. *Asteracantha longifolia*.

The colour of the honey samples ranged from light yellow to amber by visual observation.

DISCUSSION

The present melittopalynological study of Narsapur and Hathnura mandals of Medak district

of Andhra Pradesh indicates that *Phoenix sylvestris* and *Eucalyptus globulus* constitute the chief source of nectar for the honey bees in Narsapur mandal and *Sphaeranthus indicus* as chief nectar source for honey bees in Hathnura mandal during winter period.

Table 3. Frequency classes and frequencies (%) of pollen types recovered from honey samples

Honey sample	Pollen types
MNN-16a	P — <i>Phoenix sylvestris</i> (84)
	S — Nil
	I — <i>Carthamus tinctorius</i> (5.2), <i>Sphaeranthus indicus</i> (4.1), <i>Ricinus communis</i> (3.4)
	M — Man (1.5), Ail (0.66), Caj (0.5), Bra, Caru, Run (each 0.16), Caps, Caesu (each 0.08)
	NMP — <i>Sorghum vulgare</i> (3.92)
MNN-16b	P — <i>Eucalyptus globulus</i> (57.2)
	S — <i>Sphaeranthus indicus</i> (19.2)
	I — <i>Prosopis juliflora</i> (12.9), <i>Carthamus tinctorius</i> (7.2)
	M — Evo (2), Ast (0.4), Aca.n (0.3), Tri, Run, Cap, Triu.r (each 0.2)
	NMP — <i>Sorghum vulgare</i> (0.74), <i>Achyranthus sp.</i> (0.08)
MNN-16c	P — <i>Phoenix sylvestris</i> (82.3)
	S — Nil
	I — <i>Sphaeranthus indicus</i> (7.8)
	M — Age (2.7), Ric (2.3), Caru (1.75), Ail (1.41), Run (0.5), Pro (0.4), Cart, Man, Pro.s, (each 0.2), Caj, Lep, Caps (each 0.08)
	NMP — <i>Achyranthus sp.</i> (0.74), <i>Sorghum vulgare</i> (0.16)
MNN-18a	P — Nil
	S — <i>Eucalyptus globulus</i> (33.7), <i>Helianthus annuus</i> (30.4), <i>Carthamus tinctorius</i> (21)
	I — <i>Tridax Procumbens</i> (4.2)
	M — Cel, Pro (each 1.92), Cya (1.6), Ast (1.3), Sph (1.1), Bra (0.92), Age (0.5), Triu.r (0.42), Com (0.3), Caj, Che, Evo, Caps, Lau, Caru, Xan, Chr, Ric (each 0.08)
	NMP — <i>Cyperus rotundus</i> (2.94), Grass pollen (1.03), <i>Oryza sativa</i> (0.56), <i>Zea mays</i> , <i>Casuarina equisetifolia</i> (each 0.08)
MHM-18b	P — <i>Sphaeranthus</i> (54.6)
	S — <i>Carthamus tinctorius</i> (28.83)
	I — <i>Helianthus annuus</i> (6.75), <i>Coriandrum sativum</i> (3.80), <i>Eucalyptus globulus</i> (3.42)
	M — Tri (0.67), Ast (0.6), Ala (0.5), Caru (0.42), Pro (0.25), Age, Pho (each 0.08)
	NMP — <i>Cyperus rotundus</i> , <i>Zea mays</i> (each 0.08)

P—Predominant pollen type (> 45%); **S**—Secondary pollen types (16-45%); **I**—Important minor pollen types (3-15%); **M**—Minor pollen types (<3%); **NMP**—Pollen of non-melliferous taxa

Abbreviations for minor pollen types (<3%)

Aca.n—*Acacia nilotica*, Age—*Ageratum conyzoides*, Ail—*Ailanthus excelsa*, Ala—*Alangium salvifolium*, Ast—*Asteracantha lingifolia*, Bra—*Brassica nigra*, Caesu—*Caesulia axillaris*, Caj—*Cajanus cajan*, Cap—*Capparis zeylanica*, Caps—*Capsicum frutescens*, Chart—*Carthamus tinctorius*, Caru—*Carum copticum*, Cel—*Celosia argentea*, Che—*Chenopodium album*, Chr—*Chrozophora prostata*, Com—*Commelina bengalensis*, Cya—*Cyanotis sp.*, Evo—*Evolvulus alsinoides*, Lau—*Launaea pinnatifida*, Lep—*Lepidagathis cristata*, Man—*Mangifera indica*, Pho—*Phoenix sylvestris*, Pro—*Prosopis juliflora*, Pro.s—*Prosopis spicigera*, Ric—*Ricinus communis*, Run—*Rungia repens*, Sph—*Sphaeranthus indicus*, Tri—*Tridax procumbens*, Triu.r—*Triumfetta rhomboidea*, Xan—*Xanthium strumarium*.

Figure 1 - POLLEN SPECTRA OF NARSAPUR AND HATHNURA HONEY SAMPLES

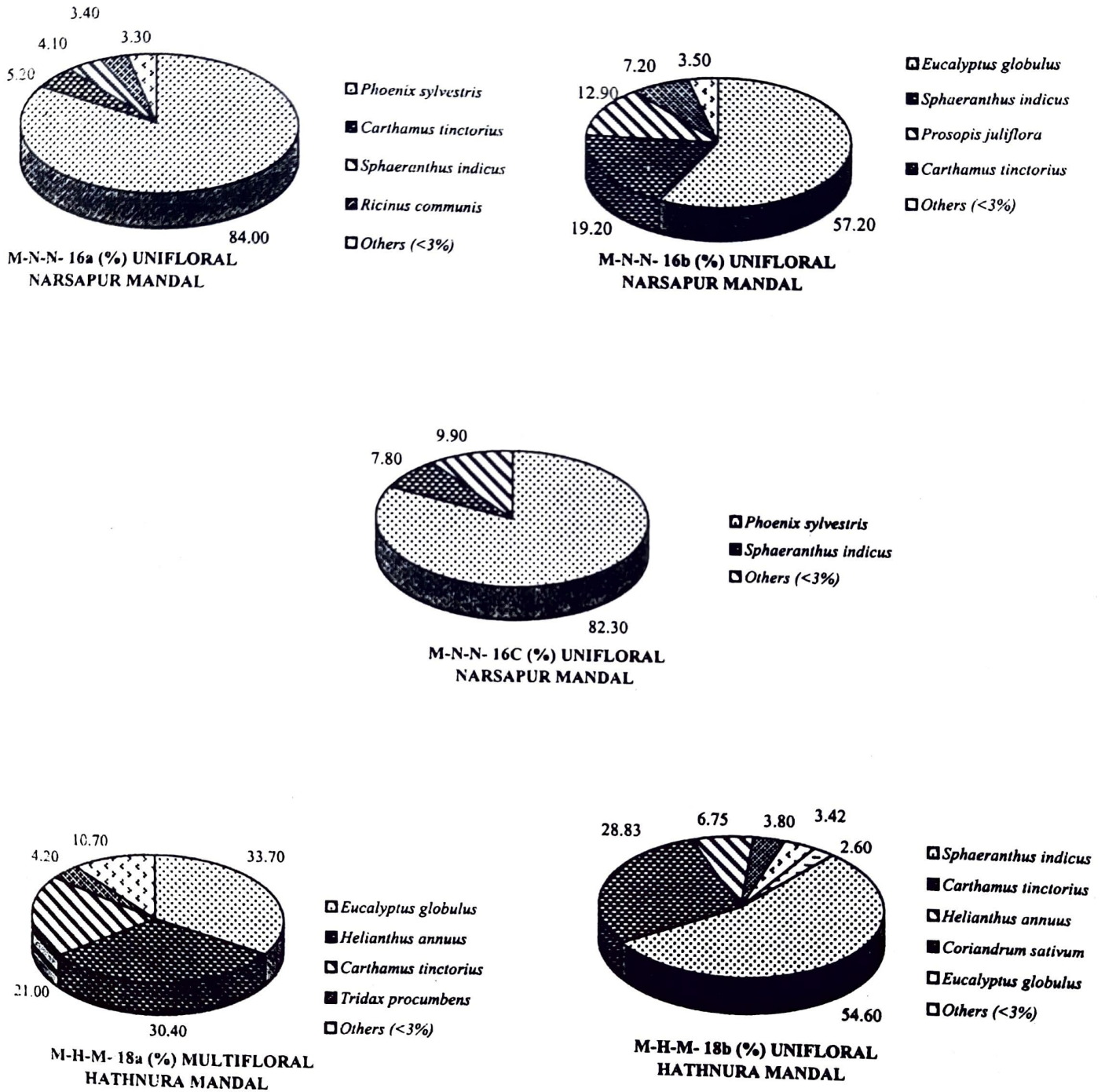


Fig. 1: Pollen spectra of Narsapur and Hathnura honey samples

Phoenix sylvestris is encountered in wild condition in and around Narsapur area. *Phoenix sylvestris* (local name: Eetha chettu), is an important source of nectar for honey bees and it is worth mentioning that partly the honey could have been derived from the sweet sap oozing out from the cut surface of spadix (Kalpana & Ramanujam 1998).

Eucalyptus globulus is cultivated on a large scale under social forestry programmes and contributed fairly to the honey production of these two mandals.

We consider all such taxa constituting predominant pollen types in the unifloral honeys as chief sources of nectar and those represented by at least 10% of the pollen spectra of each honey sample as medium sources of nectar. In view of this criterion, *Phoenix sylvestris*, *Eucalyptus globulus* serve as chief nectar sources and *Sphaeranthus indicus* and *Prosopis juliflora* as the medium sources of nectar in Narsapur mandal and *Sphaeranthus indicus* as chief source of nectar and *Eucalyptus globulus*, *Helianthus annuus* and *Carthamus tinctorius* as medium sources of nectar in Hathnura mandal.

It may be noted that though Narsapur and

Hathnura are the two neighbouring mandals, there is significant pollen diversity in their honey samples, reflecting the floral diversity.

ACKNOWLEDGEMENT

We are extremely grateful to Prof. C.G.K. Ramanujam, Emeritus Professor, Dept. of Botany, P.G. College of Science, Saifabad, for giving valuable suggestions and encouragement during the preparation of the work and to Dr. P. Ramachandra Reddy, Head, Dept. of Botany, P.G. College of Science, Saifabad, for his cooperation and help in procuring the honey samples. We also thank Principal, P.G.C.S., (Osmania University) Saifabad, for providing facilities.

REFERENCES

- Kalpana, TP & Ramanujam, CGK 1998. Nectar source for honey bees in a coastal district of Andhra Pradesh, India. *Geophytology* **27** (1&2): 85-96.
- Louveaux, J, Maurizio, A & Vorwohol, G 1978. Methods of melissopalynolgy. *Bee World* **59**: 139-157.
- Ramanujam, CGK 1991. Bee keeping and melittopalynolgy—Perspectives and Prospects. *Prof. T.N. Navaneeth Rao commemoration volume, Osmania University, Hyderabad*. 74-79.