

Occurrence of Medicinal Plant Pollen in *Apis cerana* Honeys of Khammam District, Andhra Pradesh, India

A.Vijaya Bhasker Reddy and P.Ramachandra Reddy

Department of Botany
P.G.College of Science
Saifabad, Hyderabad-500004

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ABSTRACT

A pollen analysis of 11 honey samples from Khammam district has been carried out. According to the pollen spectra found, most of them are unifloral (10); 1 sample multifloral. Thirty-two different pollen types were recorded, belonging to 20 families. Twenty-one plants recorded from the honey samples are used as medicinal plants in folklore and tribal medicine.

Key words: Honey, Khammam district, Unifloral, Multifloral.

INTRODUCTION

Melissopalynology, one of the branches of palynology, finds a very significant application in the field of apiculture for recognizing the nectar sources and botanical origin of honey (Ramanujam 1994). In the present work, 11 squeezed honey samples of *Apis cerana* collected from the Khammam district of Andhra Pradesh have been analyzed to determine their botanical origin and medicinal properties of the plants recovered. Many of the plants recorded as bee forage plants are used as medicinal plants in folklore literature. This flower nectar contains Alkaloid and Phenolic compounds. Baker, 1977, identified these chemicals in many of the tropical flowers nectar. While foraging on these flowering plants, bees gather the honey mixed with these chemical compounds. Hence, the honey would also have the medicinal property. In folklore medicine, this honey is used for controlling the various diseases.

MATERIAL AND METHODS

The major objectives of the study were to document the bee forage plants of *Apis cerana* and the medicinal uses of the recorded flora from the honey samples. Eleven squeezed honey samples were collected from the various mandals of the Khammam district. For preparation of the palynoslides 5 cc of the honey was diluted in 10cc of water and centrifuged. The resultant sediment was treated with 5 cc glacial acetic acid. Subsequently the acetic acid was removed and the material was subjected to traditional acetolysis technique (Erdtman, 1960). To analyze the pollen contents, three pollen slides were prepared for each sample and examined. Pollen types were identified as far as possible to the genus or species level with the help of reference slide collection of the local flora and relevant literature (Kiritikar, K.R. & Basu, B.D, 1995). Frequencies and frequency classes of the pollen types were determined in accordance with Louveaux *et al.* (1978). Medicinal uses of the plants were identified through the

literature and gathered from experienced and aged persons. The enumeration of plants includes botanical name, followed by name of the family, local name in Khammam district and the uses of different plant parts were recorded.

OBSERVATIONS

Pollen analysis:

Winter samples show the presence of pollen referable to *Melilotus alba* (Fabaceae), *Evolvulus alsinoides* (Convolvulaceae), *Mimosa hamata* (Mimosaceae), *Feronia elephantum* (Rutaceae), *Sesamum indicum* (Pedaliaceae), *Zizyphus mauritiana* (Rhamnaceae), *Borassus flabellifer* (Arecaceae), *Erythrina indica* (Fabaceae), *Ageratum conyzoides* (Asteraceae), *Crotalaria juncea* (Fabaceae), *Capsicum frutescens* (Solanaceae), *Xanthium strumarium* (Asteraceae), *Alternanthera sessilis* (Amaranthaceae), *Amaranthus viridis* (Amaranthaceae), *Coccinia indica* (Cucurbitaceae), *Celosia argentea* (Amaranthaceae), *Aspidopteris indica*, *Psidium guajava* (Myrtaceae). Of these, the pollen of *Melilotus alba* (47%), *Ageratum conyzoides* (57.5%), *Aspidopteris indica* (82.5%) being represented by more than 45% and referred as predominant pollen type. Further these honeys are known as Melilotus, Aspidopteris, Ageratum honeys. The pollen of *Crotalaria juncea* (20%) represents the secondary pollen type. Other pollen types are placed under important minor and minor pollen categories.

Summer honeys consist of number of pollen types referable to *Phoenix sylvestris*, *Capsicum frutescens*, *Borassus flabellifer*, *Coccinia indica*, *Tridax procumbens*, *Capparis grandis*, *Dillenia pentagyna*, *Syzygium cumini*, *Chrozophora indica*, *Schleichera oleosa*, *Terminalia arjuna*, *Acacia nilotica*, *Lagerstroemia parviflora*, *Zizyphus xylocarpa*, *Sapindus emarginatus*, *Gardenia lucida*, *Guazuma ulmifolia*, *Madhuca indica*, *Bombax ceiba*, *Feronia elephantum*, *Strychnos potatorum*, *Croton bonplandianum*, *Azadirachta indica*. Of these, the pollen of *Phoenix sylvestris* (53.75-83.75%), *Dillenia pentagyna* (90%), *Schleichera oleosa* (53.75%), *Gardenia lucida* (47.5%) being represented by more than 45% of the palynoassemblage of the summer honey samples are represented to the predominant pollen types. These honeys are designated as the Phoenix, Dillenia, Schleichera, Gardenia honeys.

Table 1: pollen analysis of *Apis cerana* honeys of Khammam district.

WINTER SAMPLES:

1.C-K-K-10-9-05 (Chintoor -Mandal, Katukapalli-Village, Khammam-District)

P- *Melilotus alba*-47%, **S-** NIL, **I-** *Evolvulus* -14%, *Mimosa hamata*-11.25%,
Feronia- 11.5%, *Sesamum*--4.25%, **M-** *Zizyphus* -2.75%, *Borassus*- 1%,
Erythrina -0.75%,

2.B-B-K- 20-12-06(Badrachalam-Mandal, Bhudevipeta-Village, Khammam-District)

P- *Ageratum conyzoides*- 57.5%, **S-** *Crotalaria juncea*- 20%, **I-** *Capsicum* –
11.75%, **M-** *Xanthium* -2%, *Alternanthera* -1.75%, *Amaranthus* -1.5%,
Coccinia-1.5%, *Celosia* -0.75%

3.B-N-K-16-10-07(Bhurghampad-Mandal, Nagaram-Village, Khammam-District)

P- *Aspidopteris indica*- 82.5%, **S-** NIL, **I-** *Mimosa hamata*-9.5%, *Psidium* -8%
M-NIL

SUMMER SAMPLES:

4.B-C-K-15-3-05 (Badrachalam-Mandal, Chodavaram-Village, Khammam-District)

P- *Phoenix sylvestris*-83.75%, **S-** Nil, **I-** *Capsicum* -10.25%, **M-** *Borassus* – 2.75%, *Coccinia*-1.33%, *Tridax* -0.66%, *Capparis* -0.75%.

5.C-B-K-2-4-07 (Chintoor-Mandal, Bodugudem-Village, Khammam-District)

P- *Dillenia pentagyna*-90%, **S-** NIL, **I-** *Syzygium* -6.25%, *Chrozophora* - 3.75%, **M-** NIL

6.C-N-K-10-4-07 (Chintoor-Mandal, Nellipaka-Village, Khammam-District)

P- *Dillenia pentagyna*- 58.75%, **S-** *Schleichera oleosa*-24.50%, **I-** *Terminalia* - 3%
M- *Acacia* -2.5%, *Lagerstroemia*-1.25%.

7.V-B-K-20-3-07 (Velurupad-Mandal, Banjara-Village, Khammam-District)

P- *Schleichera oleosa*-53.75%, **S-** NIL, **I-** *Zizyphus* -15%, *Sapindus* -10%,
Capparis -7.5%, *Terminalia* -6.25%, *Syzygium*- 5%, **M-** *Borassus* -2.5%.

8.K-B-K-1-4-07 (Kuknur-Mandal, Barlamadugu- Village, Khammam-District)

P- *Gardenia Lucida*-47.5%, **S-** *Schleichera* - 38%, **I-** *Lagerstroemia* -7.5%, *Zizyphus* -5%, **M-** *Acacia*- 2%.

9.B-R-K-5-4-07 (Burgampad-Mandal, Rudramkota- Village, Khammam-District)

P- NIL, **S-** *Schleichera oleosa*-18%, **I-** *Zizyphus* -13.75%, *Dillenia*-11%, *Syzygium* - 10%, *Terminalia* -7.5%, *Borassus* -6.75%, *Guazuma* -6.25%, *Tridax*-6.25%,
Melilotus - 5%, *Madhuca* -4.25%, *Bombax*-3.75%, *Lagerstroemia* –3.75%,
M- *Feronia* -2%, *Strychnos* -1.75%.

10.M-T-K-3-4-07 (Mulkalapalli-Mandal, Togudem- Village, Khammam-District)

P- *Schleichera* -80%, **S-** NIL, **I-** *Sapindus* -6.25%, *Croton*-7.50%, *Borassus* -5%,
M- *Bombax ceiba*-1.25%,

11.M-M-K-7-4-7 (Mulkalapalli-Mandal, Madavaram- Village, Khammam-District)

P- *Schleichera oleosa*-72.5%, **S-** NIL, **I-** *Lagerstroemia* -8.75%, *Azadirachta* - 8.75%, *Terminalia* -5%, *Strychnos* -5%, **M-** NIL.

P- Predominant pollen, **S-** Secondary pollen, **I-** Important minor pollen, **M-** Minor pollen

MEDICINAL USES

1. *Ageratum conyzoides* L.

Family: Asteraceae

Local name: Midaku

Uses: plant antihelminthic, Antipyretic, haemostatic, styptic; and used for burns, colic, cuts, headache, and uterine problems.

2. *Acacia nilotica* L.

Family: Mimosaceae

Local name: Tumma

Uses: bark extract is applied externally to cure wounds. Gum and bark paste applied over a wound will heal.

3. *Alternanthera sessilis* L.

Family: Amaranthaceae

Local name: Mullabanthi

Uses: whole plant is used as lactagogue. The leaf and root extract is given internally with honey for stomachache.

4. *Amaranthus viridis* L.

Family: Amaranthaceae

Local name: Thotakura

Uses: the root is considered diuretic, laxative, and galactagogue. The decoction is given for retention of urine and gonorrhoea; Root paste is applied for curing piles.

5. *Azadirachta indica* A.Juss.

Family: Meliaceae

Local name: Vepa

Uses: the bark is bitter; anthelmintic, relieves bad taste in the mouth, cough; cures ulcers and inflammations. The leaves are anthelmintic, insecticidal, and good in skin diseases.

6. *Bombax ceiba* L.

Family: Bombacaceae

Local name: Buruga

Uses: the gum is bitter; astringent, styptic, aphrodisiac; used in stomatitis, diseases of blood, burning of the body.

7. *Cardiospermum halicacabum* L.

Family: Sapindaceae

Local name: Butta thiga

Uses: The plant is diuretic, emetic, laxative, rubefacient; and used for chest pain and leaf juice is used for earache.

8. *Celosia argentea* L.

Family: Amaranthaceae

Local name: Gunugu

Uses: the seeds are useful in diarrhea, mouth sores. The leaves are antipyretic, aphrodisiac; reduce inflammations, strengthen the liver; useful in gonorrhoea.

9. *Croton bonplondianum* Baill.

Family: Euphorbiaceae

Local name: Galivana

Uses: the watery latex is used for skin diseases.

10. *Capsicum frutescens* L.

Family: Solanaceae

Local name: Mirapa

Uses: the fruits are used in spices and condiments.

11. *Coccinia indica* Wt. & Arn.

Family: Cucurbitaceae

Local name: Kaki donda

Uses: leaf juice mixed with castor oil is used for body pains; leaves are boiled in castor oil and applied externally in psoriasis, itch.

12. *Dillenia pentagyna* Roxb.

Family: Dilleniaceae

Local name: Ravid

Uses: fruits are laxative and used in abdominal pains.

13. *Erythrina indica* Lamk.

Family: Fabaceae

Local name: Badisa

Uses: the bark is used in dysentery; leaves are bitter, hot, stomachic, anthelmintic; improve appetite; flowers are used ear troubles.

14. *Evolvulus alsinoides* L.

Family: Convolvulaceae

Local name: vishnukrantha

Uses: the leaves and roots are used in medicine by the local tribe (Konda Reddy).

Leaves are made into cigarettes and smoked in chronic bronchitis and asthma; root is used in intermittent fever in children.

15. *Feronia elephantum* Corr.

Family: Rutaceae

Local name: Velaga

Uses: the fruit is sour, sweet; refrigerant, cardio tonic, tonic to the liver and the lungs,

astringent diuretic; the juice is good for stomatitis and sore throat; topically it relieves the pain due to stings of bees and wasps.

16. *Gardenia Lucida* Roxb.

Family: Rubiaceae

Local name: Karinguva

Uses: the yellow resin is used to suppress warts.

17. *Lagerstroemia Parviflora* Roxb.

Family: Lythraceae

Local name: konekomma

Uses: leaves are used for throat irritation

18. *Lannea coramandelica* Houtt.

Family: Anacardiaceae

Local name: Buushi

Uses: the bark and the leaves are used in ulcers.

19. *Madhuca indica* J.F. Gmel.

Family: Sapotaceae

Local name: Ippa

Uses: the milky juice from the bark is astringent; the flower is aphrodisiac, good in heart diseases, cures burning sensation; the leaves are boiled in water, and given as cure for several skin diseases. The honey from the flowers is used in the treatment of eye diseases.

20. *Melilotus alba* Desr.

Family: Fabaceae

Local name: china mentha

Uses: leaf paste is externally applied for pains and aches.

21. *Mimosa hamata* Lamk.

Family: Mimosaceae

Local name: Korindum

Uses: leaves are applied to burns.

22. *Psidium guajava* L.

Family: Myrtaceae

Local name: Jama

Uses: leaves are used for wounds and ulcers; leaves are chewed for toothache. Leaf

and bark extract is used in epilepsy.

23. *Schleichera oleosa* Lour.

Family: Sapindaceae

Local name: Poosuga

Uses: Bark paste supported by bamboo sticks is applied to cure fractured bones. For early relief, this treatment should also be accompanied by oral use of bark juice twice a day. Bark also used for skin diseases, ulcers

24. *Sapindus emarginatus* L.

Family: Sapindaceae

Local name: Kunkudu

Uses: the seeds pounded with water are given in epilepsy.

25. *Strychnos potatorum* L.

Family: Loganiaceae

Local name: Chilla

Uses: the seeds are used to clear turbid water; astringent to the bowels, diuretic; the root cures all kinds of leucoderma.

26. *Terminalia arjuna* W. & A. Prodr.

Family: Combretaceae

Local name: Tellamaddi

Uses: the bark is antidiysenteric; useful in fractures, ulcers, urinary discharges; ashes of plant parts applied for wounds and cuts.

27. *Tridax procumbens* L.

Family: Asteraceae

Local name: Railu rodha

Uses: the juice of leaves is applied externally to cure wounds and cuts.

28. *Xanthium strumarium* L.

Family: Asteraceae

Local name: Marulamatangi

Uses: the plant is diaphoretic, sedative and used for chronic cases of malaria; the root is bitter and toxic.

29. *Zizyphus mauritiana* L.

Family: Rhamnaceae

Local name: Regu

Uses: the bark cures boils; good in dysentery and diarrhea, dry fruits removes impurities from the blood.

DISCUSSION

The results of the pollen analysis of the 11 honey samples from Khammam district indicate that *Melilotus alba*, *Ageratum conyzoides*, and *Aspidopterys indica* constitute the chief nectar source during winter; extensive distribution of *Schleichera oleosa* furnished the chief sources of nectar, followed by *Phoenix sylvestris*, *Gardenia lucida*, and *Dillenia pentagyna* during summer for *Apis cerana*. It has also been noted that most of the pollen types encountered in winter samples are from herbaceous taxa whereas in summer from tree taxa. The present study highlighted the following melliferous taxa, which are characteristic elements of the forest, as fairly reliable nectar sources for bees: *Dillenia pentagyna*, *Schleichera oleosa*, *Gardenia lucida*, *Lagerstroemia parviflora*, *Terminalis arjuna*, *Feronia elephantum*, *Strychnos potatorum*, *Zizyphus xylocarpa*, *Syzygium cumini*.

Our studies on medicinal properties of the plants recorded from the honey samples indicate that many of the plants are being used as medicinal plants by the local practitioners and tribal people (Koya and Konda Reddy). However, the authors are of the opinion that the medicinal properties of the honey are attributable to the fact that the pollen comes from medicinal plants. An in depth study, mainly experimental with clinical efficacy of these plants and honeys is essential in many cases.

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