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POLLEN ANALYSIS OF TWO MULTIFLORAL HONEYS FROM HYDERABAD, A.P.

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The paper deals with qualitative and quantitative pollen analysis of two extracted (apiary) samples of honey obtained from two localities of Hyderabad, viz. Hardikarbagh and Jubilee hills. The samples studied showed no predominant pollen type. *Helianthus annuus* (Asteraceae) is the secondary pollen type (23.33%) of Hardikarbagh sample, while *Eugenia jambolana* (Myrtaceae) is the secondary pollen type (23.33%) of Jubilee hills sample. The other significant pollen types recorded are those of *Cocos nucifera*, *Abutilon*, *Amaranthus*, *Bauhinia variegata*, *Psidium guajava*, *Zizyphus jujuba*, *Ailanthus excelsa*, *Citrus limonum*, *Lagerstroemia flos–reginae*, *Jatropha*, *Azadirachta indica* etc. Both the honey samples are of multifloral nature and are referable to Group II of I C.B.B. on the basis of their absolute pollen counts.

Key words : Pollen analysis, Multifloral honeys, Hyderabad.

Introduction

The honey marketed in India falls under 2 categories, namely, extracted (apiary) honey and squeezed honey. The bulk of the extracted honey is obtained from *Apis cerana* var *indica*. A basic knowledge of the pollen contents of honey is of great importance to diagnose the botanical source and the origin of honeys. The authors have undertaken a critical analysis of the diverse honey samples of Hyderabad and Secunderabad regions with the aim of identifying all such plants that offer abundant nectar and pollen to the bees, in order to recognise the unifloral and multifloral honeys of this region and thereby evaluate its potential in the apiary industry.

Material and Method

Two extracted (apiary) samples were obtained during January and May, 1989 from Hardikarbagh and Jubilee hills areas in Hydarabad respectively. For qualitative pollen analysis about 1 ml of honey was diluted by 10 ml of water and centrifuged. To the resultant sediment 5ml of glacial acetic acid was added and subjected to acetolysis technique (Erdtman, 1952). Based on the frequency of each type, the pollen grains recorded were classified as predominant pollen type (above 45%), secondary pollen type

(16–45%), important minor pollen types (3–15%) and minor pollen types (below 3%) (I.C.B.B. 1970). For quantitative pollen analysis, 300 pollen grains were counted from three slides at random and pollen frequency of each type was worked out from their total count. Identification of pollen types was done by comparing with reference slides of the pollen of the local flora.

Observations

The Hardikarbagh honey sample is golden yellow and dense while that of Jubilee hills is reddish brown and slightly thinner. Both the samples of honey studied were found to be qualitatively rich in pollen contents. There is, however, no predominant pollen type either in Hardikarbagh or Jubilee hills samples. In the Hardikarbagh honey, *Helianthus annuus* (23.33%) is the secondary pollen type. The important minor types of this honey are *Cocos nucifera* (14.66%), *Abutilon* sp (11.66%), *Amaranthus* sp (8.33%), *Bauhinia variegata* (6.66%), *Psidium guajava* (6.66%), *Zizyphus jujuba* (5%), and *Ailanthus excelsa* (3.66%). The minor pollen types are Compositae (1.66%), *Portulaca* sp (1.66%), *Jatropha* sp (1.33%), Labiatae (1.33%), *Citrus limonum* (1.33%), *Moringa oleifera* (1.33%), *Peltophorum ferrugeneum* (1%), *Casuarina equisetifolia* (0.66%), *Loranthus longiflorus* (0.66%), *Albizia lebbek* (0.33%), Umbelliferae (0.33%) and *Chenopodium* sp (0.33%). This is a multifloral honey.

In the Jubilee hills sample, however, *Eugenia jambolana* (23.33%) is the secondary pollen type, and *Cocos nucifera* (13.33%), *Citrus limonum* (8.33%), *Jatropha* sp (8.30%), *Azadirachta indica* (6.66%), *Lagerstroemia flos-reginae* (6.33%) and *Tridax procumbens* (4.33%) are the important minor pollen types. The minor pollen

Figs. 1–2 Hyderabad honey Spectra Ab–*Abutilon* sp; Ai–*Ailanthus excelsa*; Am–*Amaranthus* sp; Az–*Azadirachta indica*; Ba–*Bauhinia variegata*; C–Compositae; Co–*Cocos nucifera*; Ci–*Citrus limonum*; Cu–Cucurbitaceae; F–Fungal spores; Ja–*Jatropha* sp; La–Labiatae; Lag–*Lagerstroemia flos-reginae*; OT–Other types; P–*Portulaca* sp; PD–Plant and dust particles; Ps–*Psidium guajava*; So–solanaceae; Tr–*Tridax procumbens*; U–Unknown; Zi–*Zizyphus jujuba*.

Figs. 3–15. Photomicrographs of some of the significan pollen types recorded (All figs × 750). 3 Labiate; 4 *Helianthus annuus*; 5 *Eugenia jambolana*; 6 *Lagerstroemia flos-reginae*; 7 *Ailanthus excelsa*; 8 *Loranthus longiflorus*; 9 *Azadirachta indica*; 10 Cucurbitaceae; 11 *Bauhinia variegata*; 12 *Zizyphus jujuba*; 13 *Jatropha* sp; 14 *Amaranthus* sp; 15 *Cocos nucifera*.

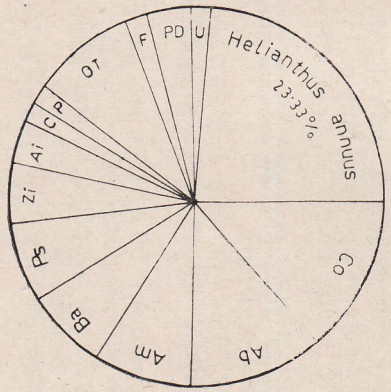
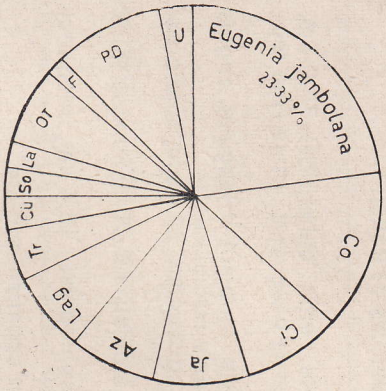

Helianthus annuus
23.33%
U
PD
F
Or
Cl
Ai
Zi
Ba
Am
Ab
Co

FIG-1


Eugenia jambolana
23.33%
U
PD
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Or
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C
Co

FIG-2

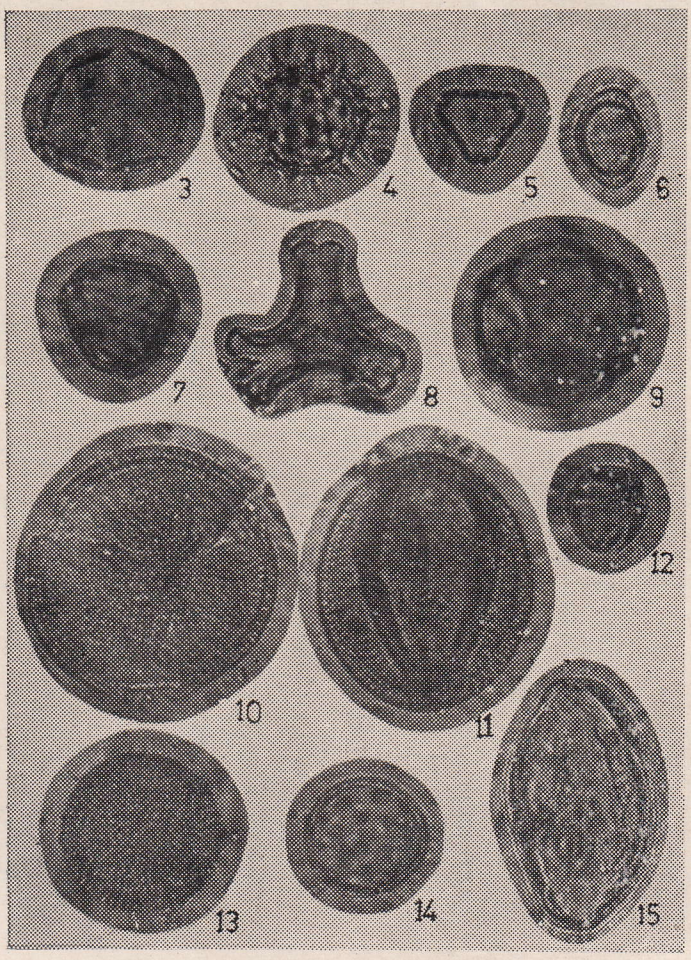
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Table 1. Pollen types and essen ial features of pollen.

Pollen Types Recorded	Made of Pollination	Flowering Period	Essential Features of Pollen
Abutilon sp	E	Aug–Oct	3-colporate, brevicolpate, amb spheroidal, 77.0 μm, spinate, exine thick at spine base and interspinal region granulate.
Ailanthus excelsa	Am	Jan–Apr	3-colporate, ora lalongate, Amb sub-triangular, angles ± truncate, 28 6 μm, finely reticulate.
Amaranthus sp	E	whole yr	Panorate, Pores–15-18, spheroidal, 26.4 μm, interporal area granulate
Albizia lebbek	Am	Mar–June Sep–Oct	Polyads, 16 celled spheroidal, 69–75 μm, exine thick faintly granulate.
Alternanthera sessiles	E	Mar–May	Panporate, Pores 12, spheroidal, 15.4 μm, interporal regions granulate.
Azadirachta indica	E	Mar–June	4-colporate, amb almost squarish, prolate, 46.2X39.6 μm, psilate to finely Granular.
Bauhinia variegata	E	Feb–Apr	3-colporate, sub–prolate to sub–spheroidal, 66.0 × 55.0 μm, exine thick, striate.
Casuarina equisetifolia	A	Jan–Mar	3-Porate, pores aspidate, amb triangular with slightly convex sides, 30.8 μm, finely granulate to psilate.
Chenopodium sp	E	whole yr	Panporate, Pores 12–15, spheroidal, 22.0 μm, interporal area granulate.
Citrus limonum	E	Feb–Mar	4-colporate, amb almost squarish, 24 2 × 22.0 μm, distinctly reticulate, heterobrochate.
Cocos nucifera	E	whole year	Monosulcate, elliptical, 59.4 μm, long and 37.4 μm, broad, exine conspicuously folded, finely granulate to psilate.
Delonix regia	E	Mar–May	3-colporote, prolate–spharoidal, 59.4 × 55.0 μm, exine thick, reticulate, lumina with free bacules.
Eugenia jambolana	E	Mar–May	3-colporate, syncolpate, parasyncolpate, amb triangular, 17.6 × 22.0 μm, psilate.
Helianthus anuuus	E	July–Oct Jan–Mar	3-colporate sub spheroidal, 39.6 μm, prominently echinate.
Jatropha sp	E	whole year	Inaperturate, spheroidal, 44 0 μm, sculpture of crotonoid pattern.

Lagerstroemia flos-reginae	E	Apr-May	3-Colporate, Prolate, 24.2×19.8 μm, with distinct polar thickening, finely granular.
Loranthus longiflorus	E	Jan–Apr July-Sept	3-colpate, syncolpate, amb triangular with concave sides, 33 0μm, faintly granular to psilate.
Moringa oleifera	E	whole year	3-colporate, sup-spheroidal, 30.8 μm, finely granular to psilate.
Peltophorum ferrugeneum	E	July-Sept Mar–Apr	3-colporate, sub-spheroidal, 55.0 μm, reticulate, muri simplibaculate, lumina psilate.
Protulaca sp	E	July–Sept Dec–Feb	Pancolpate, colpae short, streak like, ends pointed, spheroidal 70.4 μm, spinulose to rugate.
Psidium guajava	E	Mar–Apr Aug–Sept	3-colporate, parasyncolpate, amb triangular, per oblate 17.6 μm, finely granulate.
Sapindus emarginatus	E	Oct–Jan	3-colporate, amb sub-spheroidal, suboblate 22.0 μm, nexine thick, psilate.
Tridax procumbens	Am	whole year	3or4-colporate, amb almost rounded, 39.6 μm, prominently echinate.
Zizyphus jujuba	E	Sept–Oct	3-colporate, amb rounded triangular, sub-oblate, 26,0 μm×30.0 μm, psilate.

E=Entomophilus ; Am=Amphiphilous ; A=Anemophilous.

types of this sample are Cucurbitaceae (2.66%), Solanaceae (2.33%), Labiatae (2%), *Sapindus emarginatus* (1.33%), Liliaceae (1.33%), *Delonix regia* (1%), *Alternanthera* (1%), *Portulaca* sp (0.66), *Peltophorum ferrugeneum* (0.66%), *Amaranthus* sp (0.66%), Umbelliferae (0.66%) and *Loranthus longiflorus* (0.66%). This is also multifloral honey. Fungal elements were also recorded from both the samples and their percentage varies from 2.33% to 1.66%. (Figs. 1 and 2).

Absolute pollen count—To count the number of grains in 1 gm/10 gm of honey the method recommended by C.B.R.I. (Suryanarayana *et. al.* 1981) was applied. The absolute pollen count in terms of number of grains per 10 gm of honey is 1,00,000 in the Hardikarbagh honey and 50,000 in the Jubilee hills sample. According to the classification of International commission for Bee Botany (1970) both the samples are referable to Group II.

Discussion

The pollen spectra of both the samples showed diversity of pollen types originating from both wild and cultivated plants. On the whole 29 pollon types referable to 24 families have been recorded. Some pollen types like *Cocos nucifera, Amaranthns, Citrus limonum, Jatropha, Peltophorum ferrugeneum, Loranthus longiflorus,* Umbelliferae and Labiatae were found to be common in both the samples. Table 1 provides information about pollination mechanism, the flowering period and the essential features of each pollen type recorded from the honey samples. The presence of the pollen of *Casuarina equisetifolia*, an anemophilous taxon *albeit* in negligible percentage in one of the two honey samples studied is indeed surprising. While *Casuarina* does not constitute any nectar source, whether it provides pollen to the foraging bees merits serious consideration. A study of pollen loads either directly from the foraging bees or from the pollen chambers of the beehives should enable us to verify this aspect.

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