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Melittopalynological Analysis of *Apis Dorsata* Honey of Kotagiri Slopes, Nilgiris, Tamil Nadu

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Abstract:

Kotagiri is one of the important honey producing zones in the Nilgiris (Anonymous, 2001). Honey collection from Apis dorsata hives is an income generation activity for the honey hunters of this region. The present work involves analysis of Apis dorsata honey from the forest of Kotagiri slopes in the Nilgiris with a view to know the pollen and nectar sources for the bees. As part of the investigation, 18 honey samples were collected from the honey hunters during the honey harvest season in June-July, 2011. The samples were acetolysed. A total of 10 pollen types were present in the honey sample studied. The present study indicates the importance of Syzygium cuminii and Pterolobium hexapetalum as a major source of forage to the bees. Efforts to enhance the cultivation of these species can be suggested. Syzygium cumini yield edible fruits and also help in the development of bee keeping and forest honey production in the region.

Key words: Kotagiri, *Apis dorsata*, Kotagiri, pollen, species cultivation

1. Introduction

Kotagiri is one of the important honey producing zones in the Nilgiris (Keystone, 1994). Kotagiri is located at 11.43°N 76.880°E (Fig 1). It has an average elevation of 1793 metres (5882 ft). Kotagiri slopes forms the eastern part of the Nilgiri Biosphere Reserve and the district bordering the Sathyamanagalam hills to the east, Coimbatore district to the south and with Ooty, Coonoor taluks to the west & Southwest. These slopes comprise a large tract of contiguous forests located on steep slopes at altitude ranging from 1600 to 300m above sea mean level. Land use in the upper area, mostly comprising of tea estates and other vegetable cultivated fields where the altitude varies from 1500 to 2000 meters MSL. The location is as such that the region receives moderate rainfall compared to the other parts of the district. The variation is from 800mm to 1500mm which is less towards to the eastern side of the region. The vegetation types of this region are evergreen, semi evergreen, moist deciduous in the middle escarpments and dry deciduous towards the lower slopes and finally scrub jungle towards the extreme eastern slopes. Streams flowing down-stream with many perennial and some seasonal flows during rainy season in these slopes with the riverine vegetation present.

Kotagiri is one of the important honey producing zones in the Nilgiris (Keystone, 1994). Honey collection from *Apis dorsata* hives is one of the major income generation activities for the honey hunters of this region. The application of melittopalynology is concerned with the identification of pollen in honey. Evaluation of plants for their utility as sources of bee forage provides information to assess the potential for bee keeping in an area (Ramanujam and Khatija, 1991). Review of literature indicates that some work has been done on *A. dorsata* forage by Jhansi et al. (1991), Ramanujam and Khatiza (1992), Ramanujam (1994), Laxmi and Suryanarayan (1997) from south India. 80% of the honey marketed in India comes from rock bees (Mahendra, 1997). The present work involves analysis of *Apis dorsata* honey from the forest of Kotagiri slopes in the Nilgiris with a view to know the pollen and nectar sources for the bees

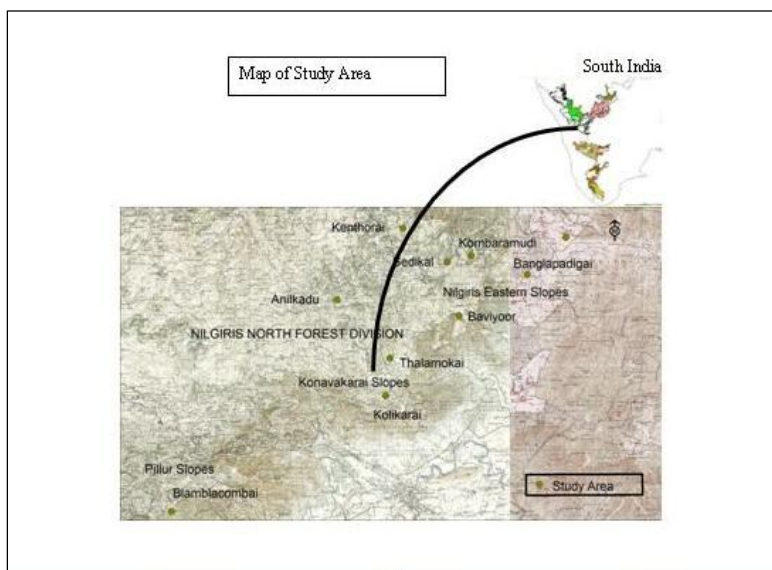


Figure 1: Map of study site

2. Material and Method

As part of the investigation, 18 honey samples were collected from the honey hunters during the harvest season in June-July, 2011. Pollen slides were prepared by acetolysis (Erdtman, 1960) for each sample. The pollen types were identified with the help of reference slide of local flora. The pollen types were identified to generic and specific levels. In some cases to family level. For determining the frequency classes of pollen type, 500 pollen grains were counted and categorized as predominant (>45%), secondary pollen types (16-45%), important minor pollen types (3-15%) and minor pollen types (<3%) (Louveaux et al, 1978). The moisture content was noted using a refractometer and pH for each samples was recorded using a digital pH meter.

Region	Forest range	Water content	pH	Frequency class/Pollen type
				Predominant > 45, Secondary 16-45, Important minor-15-3, Minor <3
Kotagiri	Banglapadigai	21.2	3.7	Predominant- Syzygium cuminii (64.4); Secondary-Pterolobium hexapetalum(29.2); Important minor- Schleichlera oleosa (12), Acacia sp. (4); Minor- nil
Kotagiri	Seddikal	21.2	3.8	Predominant - Syzygium cuminii (64.4); Secondary-Pterolobium hexapetalum(30.8); Important minor- Acacia sp. (4.4); Minor- Cocos nucifera (2)
Kotagiri	Baviyoor	23.1	3.4	Predominant - Syzygium cuminii (53.6); Secondary -Pterolobium hexapetalum(31.6); Important minor- Schleichlera oleosa (13); Minor- nil
Kotagiri	Baviyoor	21.2	3.5	Predominant - Syzygium cuminii (49); Secondary -Pterolobium hexapetalum(22.8); Important minor- Schleichlera oleosa (11.2), Acacia sp. (7), Compositae (9); Minor- nil
Kotagiri	Kenthuni	21.2	3.6	Predominant-Syzygium cuminii (76.2); Secondary-Pterolobium hexapetalum(19.6); Important minor- nil; Minor- Poaceae (2.4)
Kotagiri	Kolithorai	22.3	3.5	Predominant- Syzygium cuminii (48.4); Secondary-Pterolobium hexapetalum(36.4); Important minor- Schleichlera oleosa (13.6); Minor- Cocos nucifera(2.4)

Kotagiri	Baviyoor	22.3	3.9	Predominant - <i>Syzygium cuminii</i> (55.8); Secondary - <i>Pterolobium hexapetalum</i> (26.4); Important minor- <i>Schleichlera oleosa</i> (7.8), <i>Acacia sp.</i> (6.4); Minor- <i>Cocos nucifera</i> (2)
Kotagiri	Kattabettu	19.2	3.9	Predominant - <i>Syzygium cuminii</i> (56.8); Secondary - <i>Pterolobium hexapetalum</i> (31.8); Important minor- <i>Schleichlera oleosa</i> (11.6); Minor- nil
Kotagiri	Anthiyarai	22.3	4	Predominant - <i>Syzygium cuminii</i> (47.2); Secondary - <i>Pterolobium hexapetalum</i> (32.8); Important minor- <i>Strobilanthus sp.</i> (4.8), <i>Rubiaceae</i> (10.8); Minor- nil
Kotagiri	Sedikkal	20.2	3.8	Predominant - <i>Syzygium cuminii</i> (49); Secondary - <i>Pterolobium hexapetalum</i> (28.8); Important minor- <i>Schleichlera oleosa</i> (7); Minor- nil
Kotagiri	Kunjabannai	23.1	3.9	Predominant - <i>Syzygium cuminii</i> (64.4); Secondary - <i>Pterolobium hexapetalum</i> (29.2); Important minor- <i>Acacia sp.</i> (4); Minor- nil
Kotagiri	Anilkadu	21.2	3.9	Predominant - <i>Syzygium cuminii</i> (59.2); Secondary -nil; Important minor- <i>Schleichlera oleosa</i> (28.8), <i>Acacia sp.</i> (6.4); Minor- <i>Rubiaceae</i> (2.4), <i>Compositae</i> (2), <i>Verbenaceae</i> (1.2)
Kotagiri	Kambiyoor	22.3	3.9	Predominant - <i>Syzygium cuminii</i> (65.6); Secondary - <i>Pterolobium hexapetalum</i> (32); Important minor- nil; Minor- <i>Rubiaceae</i> (2.4)
Kotagiri	Sedikkal	22.3	4.5	Predominant - <i>Syzygium cuminii</i> (55.4); Secondary - <i>Schleichlera oleosa</i> (31); Important minor- nil; Minor- <i>Acacia sp.</i> (4.2)
Kotagiri	Kolikarai	23.1	3.7	Predominant - <i>Syzygium cuminii</i> (50.8); Secondary - <i>Pterolobium hexapetalum</i> (26.8); Important minor- <i>Cocos nucifera</i> (18.4), <i>Acacia sp.</i> (2.4); Minor- <i>Malvaceae</i> (1.6)
Kotagiri	Anilkadu	21.2	3.7	Predominant - <i>Syzygium cuminii</i> (75.6); Secondary - nil; Important minor- <i>Schleichlera oleosa</i> (7), <i>Acacia sp.</i> (12.4); Minor- <i>Rubiaceae</i> (2.4)
Kotagiri	Kambiyoor	22.3	4	Predominant- <i>Syzygium cuminii</i> (62.2); Secondary -nil; Important minor- <i>Schleichlera oleosa</i> (26.4), <i>Acacia sp.</i> (4.8); Minor- <i>Rubiaceae</i> (2.6)
Kotagiri	Komaramudi	22.3	3.9	Predominant - <i>Syzygium cuminii</i> (73.4); Secondary -nil; Important minor- <i>Acacia sp.</i> (7.8); Minor- <i>Schleichlera oleosa</i> (2)

Table 1: Pollen types found in the honey samples

3. Result and Discussion

A total of 10 pollen types were present in the 18 honey sample studied (Table 1). All the honey was unifloral, having a single pollen species a predominant type. The pollen of *Syzygium cuminii* is seen as a predominant pollen type in all the samples. *Pterolobium hexapetalum* and *Schleichera oleosa* is found to be a secondary pollen type. The other pollen types include *Acacia* type, *Cocos nucifera*, *Rubiaceae*, *Strobilanthus sp.* and *Poaceae*. The presence of *Syzygium cuminii*, *Pterolobium hexapetalum* and *Schleichera oleosa* pollen could be due to the flowering of these species at the same time. The flowering period is from Mar-May. *Syzygium spp.* has been reported as a predominant pollen type in Karnataka (Singh, 1997) and Andhra Pradesh (Lakshmi and Suryanarayna, 1997). *Cocos nucifera* is anemophilous pollen, Suryanarayana et al (1990) reported it as a nectar source. The pollen type identified in the honey sample belongs to economical important and constitute major part of the flora in the region, *Syzygium cumini* and *Pterolobium hexapetalum* appears to be the major source of forage to the bees. The moisture content of the samples varied from 19.2%-23.1 % and the pH ranged from 3.4 -4.5. The present study indicates the importance of *Syzygium cuminii* and *Pterolobium hexapetalum* as a major source of forage to the bees. Efforts to enhance cultivation of these species can be suggested. *Syzygium cumini* yield edible fruits and also help in the development of bee keeping and forest honey production in the region.

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